


Securing the Conservation of biodiversity across Administrative Levels and spatial, temporal, and Ecological Scales

Scale sensitivity and scale effectiveness of governance in biodiversity conservation

National regulatory model of biodiversity policy

FINLAND

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PENSOFT

This report should be cited as:
Paloniemi R., Koivulehto M., Primmer E., Similä J., 2014. Scale sensitivity and scale effectiveness of governance in biodiversity conservation. National regulatory model of biodiversity policy in Finland. 111 pp.

This report has been produced as a part of SCALES WP4 (deliverable D4.2 including five national policy reports and a summary) from 2009 to 2011.

ISBN 978-954-642-729-8

Contents

Abstract

This report examines scale-related challenges of the nature conservation regime in Finland. In order to gain a better understanding of conservation problems and dynamics and to explore various nature conservation possibilities, we organised four focus groups, three individual interviews, and an expert roundtable to gather information from actors having various roles in nature conservation. In addition, extensive document analysis was performed. The main method of study was content analysis. Our results portray scale challenges of nature conservation as multifaceted phenomena and reveal that the most significant scale-related challenges result from the existence and interplay of various interests, incentives, policies, and values – and ultimately arise between ecological and governance scales. The report presents ideas for improved scale-sensitivity based on lessons learnt in the governance context. The differences documented in scale-sensitivity challenge us to explore variation within scales' sensitivity and to ask which scales biodiversity policies and instruments are sensitive to and to which not, along with, more importantly, why this is the case and how such sensitivities for various scales could be encouraged.

1. Introduction

Scale-related issues can be foreseen as one of the key challenges for EU biodiversity policy beyond 2010 (Henle et al., 2010). The concept of scale has been used in numerous ways, referring to various sizes (small and large), to hierarchical structures composed of several levels, and to non-linear relations between various levels (Sayre, 2008). In this report, scales are explored mainly as spatial and temporal dimensions describing phenomena relevant for biodiversity conservation – e.g., level of biological organisation, amount of socio-economic activities, and governance levels (Cash et al., 2006).

This report explores scale-sensitivity and scale-effectiveness of biodiversity conservation in Finland. *Scale-sensitivity* refers to the ability of policy design to recognise (relevant) scales of biodiversity conservation, and the concept of *scale-effectiveness* to the achievements of policy implementation to conserve biodiversity in term of those scales (cf. Primmer et al., unpublished). Often in the environmental research, spatial and temporal scales have been described as relevant for efforts to solve environmental problems such as degradation of biodiversity (Haila & Levins, 1992; Pressey & Taffs, 2001; Cowling et al., 2003; Rouget, 2003; Wheatley & Johnson, 2009; van Delden et al., 2011; Bergman et al., 2012); accordingly, we focus on these scales in the report.

1.1 Main drof biodiversity loss and challenges in biodiversity policy

In Finland, natural resource use is increasingly intensive and ever more uniform across landscapes. It can be named as the main driver of biodiversity loss (Hildén et al., 2005; Auvinen et al., 2007). Compared with other European counties, Finland has a low level of urbanisation, and a large proportion of the land is covered with natural habitats. However, the quality of the existing natural habitats has changed, contributing to increasing biodiversity loss. About 51% of the Finnish habitats were estimated to be endangered in 2008. The most significant reasons for habitat types being threatened are forestry, drainage for forestry (ditching), eutrophication of water bodies, clearing of agricultural land, and water engineering (Raunio et al., 2008). The highest level of threat faces forested habitats and the scarce agricultural habitats dependent on traditional use.

Forests represent the most common habitat types in Finland, covering at least 49% of the land area. If tree-covered mires, shores, and rocks are included, forests account for as much as 69% of the country's land surface. The majority of species in the country dwell in forest habitats. Also the majority of endangered species (39%) are forest-dwellers depending on various forest habitats and diverse characteristics of natural forests. Because of the intensive and uniform forest management practices employed on nearly all forest land for decades, even centuries, forest habitats as well as the size and age structure of forests have become, on average, more homogeneous. The changes due to forestry have been a decrease in the amount of decaying wood (coarse woody debris) and fragmentation caused by clear-felling and road construction. Also structural changes in forest stands caused by even-age management and loss of fertile forest habitats due to historical conversion to agricultural land have been reported. The main indirect background pressure generating habitat and species endangerment has been the important role of forestry and the forest industry in Finland. These two economic sectors together have historically accounted for up to 20% of the GNP. Although the national significance of forestry and the forest industry has decreased, these still generate a considerable share of the income and jobs in many rural regions. The

development of the sector has been significantly enhanced by determined policy backed up by legislation and research, implemented through standardisation of practices, planning, and guidance as well as budgetary allocations to silviculture operations (Primmer & Wolf, 2009), often contributing to the degradation of forest biodiversity.

Agricultural habitats are another relevant endangered habitat type in Finland. Agricultural landscapes cover seven per cent of the country and are much more infrequent than forest habitats. Agricultural habitats have, similarly to forest habitats, become homogenous, because of intensive and uniform agricultural practices. Whereas in the forest context the most endangered habitats consist of pristine old-growth forests, in the context of agriculture the most endangered habitats are semi-natural habitats, such as pastures and meadows. Because of structural changes in the agriculture system, especially in relation to the separation of cattle-keeping and the cultivation of fields, these habitats became endangered and fragmented in the 20th century more than any other habitat types (Luoto et al., 2003). Fragmentation of the agricultural habitats due to closing down of numerous farms, especially smaller ones; intensification (i.e., increasing farm sizes, field sizes, and focusing on a few selected cultivated plants); and chemical use have changed the quality and structure of agricultural habitats. Behind this development have been agricultural policies aimed at increased efficiency of agriculture, with the goal of increased productivity and competitiveness. The main instruments in implementation of this general policy have been subsidies and additional financing. Accordingly, species depending especially on semi-natural traditionally managed agricultural habitats have become endangered.

In addition to forests and traditional agricultural habitats, other habitats have been noted to suffer from loss of biodiversity. For example, peat extraction and drainage threatens mire biodiversity and mire covering, which accounts for a remarkable 20% of Finland's land surface. Lakes and rivers suffer from eutrophication from non-point and point sources as well as hydropower and poorly planned fish stocking, while fell environments suffer from excessive reindeer pasturing and climate change. Global climate change is one driver of biodiversity loss in all countries near polar areas. Arctic habitats, as well as Arctic and Siberian species such as the Arctic fox and Siberian jay, are likely to go extinct in Finland over the next century.

We have summarised the main drivers of various types of biodiversity loss in Table 1.

Table 1: Main drivers for loss of diversity among species, habitats, and ecosystems in Finland

	Species/populations	Habitats	Landscapes/ecosystems
Intensive forestry	Specialist species of old-growth forests, and fertile-forest types of species requiring large areas, species dependent on decaying wood, and species of mires	Quantitative: decreasing amount of old-growth forest Decreasing amount of coarse woody debris Qualitative: homogenous forests in economic use	Fragmentation of the remaining old-growth forests Decrease in pristine mire ecosystems and mire complex ecosystems
Intensive agriculture	Species of pastures and other traditional agriculture	Quantitative: decreasing amount of pastures Qualitative: homogenous, intensively cultivated fields	Fragmentation of remaining pastures
Climate change	Arctic species	Competition between southern and Arctic species	Adaptation to the global warming process

The pressures on biodiversity described above, as well as the drivers behind the direct threats, generate governance challenges ranging from policy issues of traditional nature protection to integration of conservation aspects to natural resource management and dealing with trade-offs and conflicts (Hiedanpää, 2002; Paloniemi & Tikka, 2008; Primmer & Wolf, 2009). These conflicts have surfaced from time to time in Finland and sometimes even called into question the national nature conservation policy as a whole (Hellström, 2001; Hiedanpää, 2002). The questioning of the legitimacy of nature conservation policy and dealing with often conflicting values and interests related to the use of natural resources have been the most relevant challenges of Finnish biodiversity policy recently.

1.2 Research questions

In the study, we explore developments in the Finnish regulatory regime of biodiversity conservation by focusing on general nature conservation and on the conservation and management of forest, agricultural land, and mire ecosystems. In detail, we ask the following research questions:

1) What have the governance challenges been over the last 15–20 years from the perspectives of administrative resources, conservation instruments, conservation site selection, and biodiversity monitoring?
2) What is currently challenging in the management of conservation areas and in integrative conservation?
3) How do stakeholders of biodiversity governance perceive the scale challenges of the governance regime and the interplay between actors within the regime?

2. Material and methods

In order to understand conservation problems and dynamics more fully, we analysed a large corpus of qualitative material. We organised four focus groups, three individual interviews, and a roundtable of experts to gather information from actors with various roles in nature conservation. In addition, we conducted an extensive document analysis. The main method of study was content analysis. The material and methods used are described in detail next.

2.2 Focus groups

For the focus groups, we expressed two main research questions: 1) What elements in policy design make policy (more) scale-sensitive, and 2) why might even those policies that are defined in a scale-sensitive manner appear not to be scale-effective in practice? That is, what goes well/wrong in implementation, and what barriers or bridges may exist to scale-effective policy outcomes?

We focused on a) temporal scale, b) spatial scale, c) ecological scales (ecological coherence and connectivity), d) jurisdictional scale, and e) social cross-scale linkages. We also considered the interactions of the scales mentioned[1].

In Finland, we organised four focus-group meetings, held in February and April 2011. In each focus group, we mixed governance levels (local + regional + state). For better identification of possible challenges related to biodiversity policy, we paid special attention to ensuring that different perspectives were presented in the groups when designing them. Therefore, we selected participants with different backgrounds and who have conflicting points of view on biodiversity policies.

We used purposive sampling when selecting the participants**;** i.e., we chose *key groups* (groups that we considered relevant) and included *key stakeholders* who might have different views on the subject of the discussion.

Criteria for stakeholders' selection (cf. Elbakidze et al., 2010):

- Vertical dimension: local, regional etc.
- Horizontal dimension: public, private, civil, etc.
- Hierarchical levels: senior officials / lead representatives, mid-level staff, etc.
- Participation level: groups with a leading role and maybe also groups not included in the official decision-making processes but still quite relevant (local community organisations, farmers, etc.)

National level:

Ministries (Ministry of the Environment and Ministry of Agriculture and Forestry)

National-level organisations with an important role for biodiversity conservation (e.g., Committee Nature 2000 in Greece or the Forest and Park Service in Finland)

NGOs

1 We should mention that in the comparison papers we have prepared in the context of WP4 for the SCALES project, we explore the focus-group discussions also from the perspectives of: i) participation, ii) institutional and policy interplay, iii) power relations (including links between levels of governance), iv) adaptiveness, and v) variations in scale framings of the relationship between ecological and governance scales. In defining these perspectives, we use scientific literature referring to social-ecological systems and resilience, by applying insights from other literature (for example, political ecology in the analysis of power relations and literature on policy implementation and environmental governance in analysis of policy and institutional interplay).

Regional level:
Regional-level administration (representatives of regions) for south-west Finland
Local level:
Local-level administration (representatives of municipalities)
Local community organisations
Cross-level operation:
Organisations that have a multi-level composition (e.g., Greece's management agencies or Finland's local forest management associations)
(representatives at local and regional level represented the same jurisdictions)

The focus groups represented *two cases*:

i) Triangulation of the findings from one focus group with focus group composed of different participants from the same stakeholder groups, to increase the trustworthiness of the findings
ii) Selection of a focus group consisting only of experts in natural and social sciences (only from universities and research centres) with empirical exploration of more theoretical scale-related issues; in this focus group too, we selected a mix of governance levels, by including experts from national-level research centres and also field experts working at the local or regional level.

Participants in the focus group of stakeholders approached biodiversity conservation from three, different perspectives:

1) Agricultural and forestry administration/practices
2) Nature conservation administration/practices
3) Mire conservation, a conservation initiative launched in spring 2011

In addition, the participants in the research focus group approached biodiversity conservation from a more theoretical scale-oriented perspective.

The contents of the four focus-group operations consisted of the following (see also Table 2 for differences from the perspective of multi-level governance):

Scales and Biodiversity Conservation of Forestry and Agricultural Landscape (Monday, 14.2.2011)

Discussion in the first focus group focused on scale issues in biodiversity conservation for forest and agricultural habitats. Participants act at local, regional, and/or national level in the forestry and agricultural administrative sectors. In all, there were eight participants, who represented:

the Ministry of Agriculture and Forestry,
a national organisation developing forestry practices and counselling forest-owners,
a national NGO of forestry and agricultural producers,
a regional NGO of forestry and agricultural producers (a farmer),
a regional forestry agency,
a regional association of forest-owners,
a local NGO conserving semi-natural habitats,
an eco-development project (funded by a foundation), and
municipalities.

'Scale' and Scales of Biodiversity Conservation (Wednesday, 16.2.2011)
Participants were experts in the theoretical issues of scales and/or in the empirical aspects of scales of biodiversity conservation. In all, there were six participants, representing natural- and social-science perspectives. They came from universities, a sector-based research institute, and a foundation funding environmental research. The institutions represented were

the University of Eastern Finland,
the University of Tampere,
the University of Helsinki,
the Finnish Environment Institute, and
the Maj and Tor Nessling Foundation.
Scales and Biodiversity Conservation (Monday, 28.2.2011)

Discussion in the third focus group focused on scale issues in biodiversity conservation. Participants act at local, regional, and/or national levels of environmental administration. In all, there were seven participants, who represented

the Ministry of the Environment,
regional environmental administration,
the national Forest and Park Service (an institution managing conservation areas),
the regional Forest and Park Service (an institution managing conservation areas),
a provincial federation,
a national NGO for nature conservation, and
a local NGO for nature conservation.

Scales and Biodiversity Conservation Concerning Mires and Peat (Monday, 28.2.2011)
Discussion in the final focus group focused on issues of scale related to the protection and utilisation of mires and peatlands, which is a novel topic in biodiversity policy discussion in Finland. Participants act at local, regional, and/or national level of environmental administration, presenting economic, research, and conservation interests. There were seven participants, from

a Finnish museum of natural history,
a national scientific organisation focusing on peat and peatlands,
a national authority with expertise in compensation and land-change principles,
regional environmental authorities,
the Forest and Park Service (from a regional perspective),
a national NGO for nature conservation, and
a peat company.

In addition, three researchers (except in the mire focus group, which had two) from the Finnish Environment Institute (SYKE) facilitated, documented, and participated in the discussion.

For the participants in the focus-group discussion, *an introductory document* was sent for orientation to the discussions. A common document in different language versions was used in Finland and Greece. A document from an earlier scale-related workshop with 23 participants held in Brussels in autumn 2010 (see Paloniemi et al., unpublished) was used as guidance for the introductory documents, but the material was localised for the case-study countries, and, in addition, new questions and arguments formulated for the national focus groups were included in the introductory document. It discussed some general scale questions considered relevant for conservation policy efforts – by describing, for example,

Table 2: Stakeholders of biodiversity governance participating in the focus-group discussions in Finland

State actors acting at several governance levels
Ministry of the Environment
Ministry of Agriculture and Forestry
National Land Survey of Finland
Finnish Forestry Development Centre Tapio
The region of south-west Finland
Municipalities (local administrative level)
Regional Forestry Agency
Regional environmental administrations
NGOs acting at several governance levels
National NGOs for nature conservation
Regional NGOs for nature conservation
Local NGOs for nature conservation
National NGO of forestry and agricultural producers
Regional NGO of forestry and agricultural producers
Local NGO conserving semi-natural habitats
Organisations with multi-level composition
The Forest and Park Service (a state-owned enterprise acting for biodiversity conservation and forestry)
Co-operation networks for forest biodiversity conservation
Other key, non-state actors
Network of citizens
Organisations of volunteers Finnish Museum of Natural History
Finnish Peatland Society (a scientific organisation)
Biodiversity project funded by a foundation
The scientific community
University of Eastern Finland
University of Tampere
University of Helsinki
Finnish Environment Institute
Maj and Tor Nessling Foundation
Total number of participants: 29

differences in the size of species' living environments and in movement ranges. The notion of how the borders of states, municipalities, and properties of land-owners seldom follow those of ecological entities was discussed as well (see, e.g., Saunders & Briggs, 2002). Also described, through examples, was the question of the different time scales of ecological processes and human action. The introductory document asked how different kinds of scale questions get answered in nature conservation policies and by different policy tools.

In the focus-group discussions with the stakeholders, both *current policies* and instruments and those possible *in the future* were focused upon. The discussion 'themes' used in the groups were

1) open and general scale-related questions;
2) current policies and instruments; and
3) integrative policies of the future, such as those for the European Union's Green Infrastructure.

In the group discussions, open questions and arguments (concerning the selected scales a–e, above, and theoretical angles i–v, described in footnote 1, above) were used. We presented the questions and arguments on PowerPoint slides (each question/argument on a

different slide) in order to avoid misunderstandings and help participants focus on the discussion. Much attention was paid to group dynamics in the focus groups. Different people were asked to begin the discussions of different issues, organisers took care to give equal voice to all participants, and argumentative interactions in the group were actively encouraged during the discussions (Barbour & Kitzinger, 1999).

2.3 Interviews

Three interviews were organised in order to ascertain information on the practices of biodiversity monitoring in Finland. Two of the interviewees were representatives of the government agency responsible for co-ordination of Finnish biodiversity monitoring (the Finnish Environment Institute), and the third interviewee was chosen for academic and NGO background and represented the Finnish Natural History Museum. Each of the interviewees was hand-picked. Both of the government agency's representatives were selected for their involvement in the process of the assessment of Favourable Conservation Status in Finland, while the third interviewee's academic and leisure interests related to monitoring were considered.

For the interviews, our research questions were the following: 1) What adaptive measures are necessary for the monitoring regime? 2) What adaptive measures have already been taken in Finland?

We focused on

a) domestic and EU-based needs for monitoring;
b) problems and solutions for national and EU-based monitoring regimes;
c) the assessment process for Favourable Conservation Status in Finland; and
d) new monitoring needs: ecosystem services, invasive alien species, and climate-change effects.

The interviews were conducted in the same manner as the group discussions, focusing also on *current monitoring needs* and current instruments and on those that might develop *in the future*. The interviews were semi-structured, and the same questions were used in the UK, Finland, Bulgaria, Greece, Poland, and Italy. Depending on the dynamics of each conversation, some questions were covered only cursorily while others were given more detailed answers. All interviews were recorded and then transcribed by the interviewer.

Table 3 shows the ways in which we refer to the focus groups and interviews in the report.

Table 3: Abbreviations used with reference to the focus groups and the interviewees

FA	**Forestry and agricultural administration/practices (focus group)**
ENV	Nature conservation administration/practices (focus group)
MP	Protection of mires and peatlands (focus group)
EX	Scientific experts (focus group)
MON	Monitoring (interviews)

2.4 Roundtable of experts

In November 2011, a roundtable of experts was convened to examine the current situation of legislative instruments that may support the European Union's Green Infrastructure policy in Finland. A collaborative group of six researchers deeply involved in the SCALES project analysed biodiversity conservation legislation and strategies on the basis of their importance, roles, and potential in implementation of the European Union's strategic tool of ecosystem management. The roundtable lasted three hours, and analysis was continued in more detail after the preliminary work.

2.5 Document analysis

We analysed numerous governmental documents (laws, strategies, and administrative annual reports) and leaflets and official statements of the biggest Finnish conservation-oriented non-governmental organisations, such as the Finnish Association for Nature Conservation. Also, news material was used to complement the understanding of the background of the interplay and current developments of the conservation regime.

3. Key trends in the regulatory environment over the last 15–20 years

The report explores the regulatory environment of Finnish biodiversity policy in terms of the 'governance framework', a concept we use in the manner of Paavola et al. (2009), by referring to the European directives, international agreements, and national laws directly referring to biodiversity conservation. The history and context of biodiversity governance are important for understanding current trends and dynamics as well as for revealing the role of the EU policies in its evolution and the reactive approach (Sairinen, 2000; Eckerberg & Joas, 2004). First, we provide an overview of the structures of Finnish public administration; then, we focus on the resources of environmental administration available for nature conservation efforts. Second, we provide a summary of the usage of the European nature conservation funding instrument LIFE in the Finnish context. Third, we turn to describing the main instruments of Finnish nature conservation policy, such as conservation programmes. Our description then sketches a general picture of Finnish site selection, connectivity issues, and the biodiversity monitoring regime. Site selection, connectivity, and monitoring are approached from the perspective of the European Union's influence as well as from that of longer-term developments and the dynamics of the domestic conservation regime.

3.2 Development of administrative structure and financial resources

The tasks of Finnish public administration involve general administrative responsibilities, such as maintaining public order and safety, and the provision of welfare services, such as education, health care, and social services. Public administration includes the highest government bodies, state administration (central and regional state administration led by ministries and joint groups for inter-ministry work), local government (municipal self-government, regional councils of municipalities, and self-organised city/regional development co-operation between municipalities clustered around a central city), independent judiciary entities, and administration supporting and complementing the official duties of the country's public administration.

The history of the Finnish environmental administration dates back to the establishment of the National Board of Waters, in 1970, and to the needs for nature conservation and environmental protection, which were designated as duties of provincial administrative boards in the '60s. On the provincial administrative boards, environmental matters were handled by environmental protection inspectors first, then by provincial environmental protection advisory boards, and finally by environmental protection offices. The history of Finnish environmental administration shows that environmental matters and duties were dispersed throughout the various administration sectors, forming an intricate system. The Ministry of the Environment was founded in 1983 in response to needs that arose in the 1970s for development of environmental protection administration elements, which were voiced by state and other administrative personnel. The work was supported by citizen activists. However, the road for the ministry and new administrative sector was rough at first, on account of conflicts attached to the discussions of the power and duties of the sector. It can be pointed out that the provincial administrative boards had held the responsibility for the state's regional nature conservation administration until the environmental administration was reformed in 1995 when the Finnish Environment Institute and 13 regional environmental centres were established (Pohjois-Pohjanmaan ELY, 2010). From the biodiversity conservation perspective, the most important public bodies have been the Ministry of the Environment (one of Finland's 12 min-

istries) and regional state authorities. The 13 regional environmental centres were merged with the regional administrative units for transport and economic development in 2009 (Public administration, 2010; Finnish Ministry of Finance, 2010).

Figure 1 shows the latest developments in the structure and steering arrangements of the environmental administration and the municipal environmental administration as part of the organisation of environmental administration, although this administration is based on local government administration instead of state administration. The legal act on municipal environmental protection administration was passed in the 1980s. The environmental protection authority in the municipalities is usually the environmental board, though environmental protection duties can be shared with the municipalities themselves. The environmental protection authority should co-operate with other authorities as well as with the state's environmental administration. The duties of the municipal environmental authorities have to do mainly with permissions and superintending. Also these authorities act as the local-level guardians in matters of public environmental protection interests. (Association of Finnish Local and Regional Authorities, 2011).

The *other sectors* making the greatest relevant contribution to work toward nature conservation goals have been those of land-use planning, agriculture, and forestry. Important decisions influencing land-use practices are made by national, regional, and local administration (cf. Gordon et al., 2009). Decisions on the intensity of forestry and on what biodiversity is conserved in the managed forests (such as valuable habitats) are governed by national and region-level forestry administration (Primmer & Wolf, 2009). Decisions on the degree of intensity of agriculture and decisions on biodiversity conserved on agricultural land (such as sites of 'High Nature Value') are governed by EU and national agricultural administration (Kaljonen, 2006). Far-reaching inter-sector questions such as adaptation to climate change and ecosystem services are governed by *ad hoc* or fixed-term committees (Heikkinen, 2007; Mickwitz & Melanen, 2009).

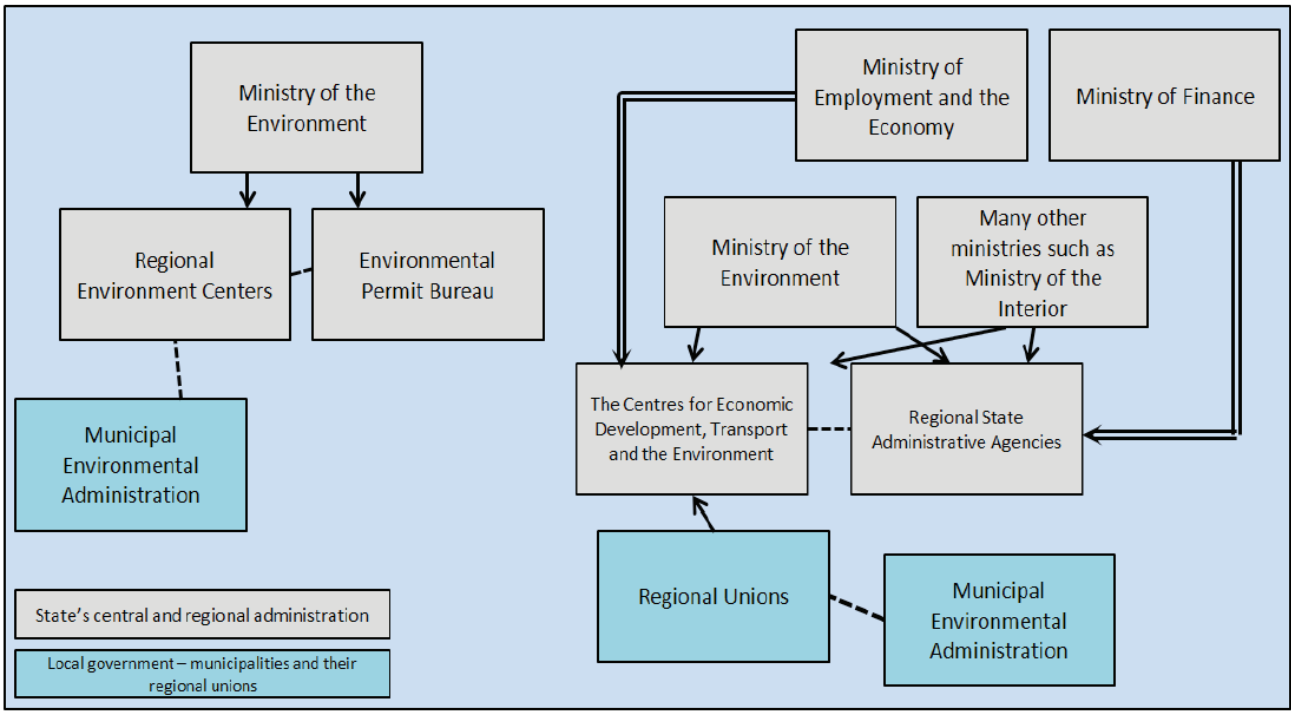

Figure 1. The multi-level structure of Finnish environmental administration – at left, before the reform of the regional administration (1995–2009); at right, after the reform (2010–2012).

Only recently, the Finnish Government with a right-wing majority has made changes in the structure of Finnish environmental administration. As shown in Figure 1, the beginning of 2010 saw most tasks of regional environmental officials reassigned to the Centres for Economic Development, Transport and the Environment. In addition, the management of environmental permits has been transferred to the new Regional State Administrative Agencies from the former Environmental Permit Offices as well as from the former Regional Environment Centres (Finnish Environmental Administration, 2010). The Centres for Economic Development, Transport and the Environment are generally governed by the Ministry of Employment and the Economy, and the new Regional State Administrative Agencies are generally governed by the Ministry of Finance, while the Ministry of the Environment advises its own administrative branch within the centres and agencies (Finnish Ministry of the Environment, 2010a).

Over the last few decades, one of the main ideas guiding the development of public-sector administration has been new public management (NPM). This refers to a combination of various interconnected reform policies, which, in combination, generate an administrative political doctrine underscoring professional management and high discretionary power and decentralising the managerial authority (see OECD, 2010). A rise in NPM has emerged simultaneously with a strengthening of neo-liberal political thinking in the developed countries generally, Finland included (Temmer, 1998; Salminen, 2003). The reason for the reform in Finland has been the aim of replacing the labour-intensive bureaucratic organisational culture with new practices and leading in the direction of a more effective and more flexible way to manage public services (Salminen, 2003). The less economically based justifications for developing accountability and stakeholder involvement have also coincided with the shrinking role of the public sector. These trends have borne the labels ‘network governance’, ‘stakeholder participation’, and ‘deliberative democracy’ (Hajer & Wagenaar, 2003; Primmer & Kyllönen, 2006; Rhodes, 2007).

The structural changes of national environmental administration seem to be a fitting example of the NPM doctrine, described above, exemplified by the Web site of the new Regional State Administrative Agencies: ‘The reform enhances the citizen and customer orientation of regional administration as well as increases efficiency and productivity in its functions’ (Regional State Administrative Agencies, 2010). However, the citizen-orientation of the NPM-based reform – restructuring of regional administration – could be questioned too. When the restructuring of regional administration was in the planning stage, it was criticised strongly and publicly by the main Finnish environmental NGOs: WWF Finland and the Finnish Association for Nature Conservation. The NGOs framed the restructuring as leading to more efficient usage of natural resources in the future instead of focusing more on the environmental concerns of civil society and the environmental issues at hand. This was considered highly likely because the reform gave control over the new centres to the Ministry of Employment and the Economy. The evaluation study of the reform of the regional administration stated that the reform in itself doesn’t produce citizen-focused administration or administrative procedures. These require the creation of work methods and enhancement of a work culture that promotes co-operation among actors of all types. Also, evaluations of the operation of the administration should be based on criteria that take into account the goals for co-operation among administration sectors and between administration, civil society, and Finnish regional councils (Karppi et al., 2011, pp. 174–175).

Finland has also had a state productivity programme in place in recent years, due to which the state has reduced its staffing. From 2005 to 2010, the state made cuts of approximate-

ly 5,000-6,000 personnel working years. The productivity programme has been described as created to balance the state's finances in response to changes that population ageing may bring for the public economy and labour market (Finnish State Auditor's Office, 2011). Environmental administration, along with other administrative sectors, has been hit by this productivity programme, as have people working at the Nature Services division of the State Forest and Park Service (*Metsähallitus*), which takes care of the management of Finnish nature conservation areas on state land. In 2010, the Forest and Park Service announced that Nature Services (with total funding of about 50 million euros/year coming from the Ministry of the Environment and Ministry of Agriculture and Forestry) might have to cut back by approximately 60 man-years of work per year because the year-2011 budget proposal had proposed a cut of three million euros from the main financing sources of Nature Services. Including earlier productivity programme needs, this cut meant five million euros less than the 2010 financing, a 10% loss of allowance, and so was deemed to necessitate releasing some Nature Services personnel (Finnish State Forest and Park Service, 2010).

Table 4 shows the decline in personnel working in Finnish environmental administration over 2006–2010. From their number in 2006, staff had decreased by 107 by 2009. There is no evidence of this trend of decrease changing.

Table 4: Personnel working in the Finnish environmental administration

Number of personnel working in…	Ministry of the Environment	Regional environmental centres	Environmental permit centres
2006	317	1,408	88
2007	301	1,376	91
2008	299	1,361	88
2009	295	1,323	88
2010	282	-	-

Source: Finnish Ministry of the Environment, 2007a, 2008b, 2009a, 2010d, 2011

Figure 2. The number of employees working in the environmental administration (*Ympäristöhallinnon toimintakertomus* 1997, 1999, 2000, 2001).

The trend in numbers of employees working in environmental administration at the time of the establishment of the regional centres is presented in Figure 2, which shows that environmental administration entities employed the most staff at the end of the 1990s.

The central government's environmental protection expenditure rose between 1994 and 2006. In 2006, central government expenditure totalled 598.1 million euros, and in 1994 the total was 220.5 million euros (these values do not take into consideration any effects of inflation). A similar increase can be seen in municipal local government environmental protection expenditure (from 390 million euros in 1994 to 613 million euros in 2006). According to Official Statistics of Finland, total expenditure on nature protection in 1994 was 44.7 million euros, representing 7.4% of the consolidated total of public-sector environmental protection expenditure (central and local governments included) in the same year. In 2006, nature protection expenditure had risen to 83.8 million euros, representing seven per cent of the public sector's total environmental protection expenditure. Official statistics are not available beyond 2006, because Official Statistics of Finland will publish environmental protection expenditure statistics gathered since then only in 2012 (Official Statistics of Finland, 2006a; Official Statistics of Finland, 2006b).

According to the state budget draft for 2012, the allowance for the administrative sector within the Ministry of the Environment would decrease from 323 million euros in 2011 to 271 million euros in 2012, which means a 16% cut in the allowance for the Ministry of the Environment. In percentage terms, the administrative division of the Ministry of the Environment is the entity losing the most in comparison with the administrative sector allowances in the draft budget for 2012 (Finnish Ministry of Finance, 2011a).

Another way to illustrate the volume of resources in biodiversity conservation is to analyse public funds directed toward conservation of biodiversity. Figure 3 depicts the allocation of the most relevant biodiversity conservation funding of the Ministry of the Environment over the last 20 years. The figure shows that purchasing sites for the state has been the main method in Finnish nature conservation, but the proportion of payments to land-owners for conserving biodiversity on their own land has increased with recent work in the Southern Finland Forest Biodiversity Programme (METSO). Not captured in Figure 3 are other sectors of government participating in governance of biodiversity conservation, of which agricultural- and forest-sector administration have an especially important role in biodiversity governance for managed lands.

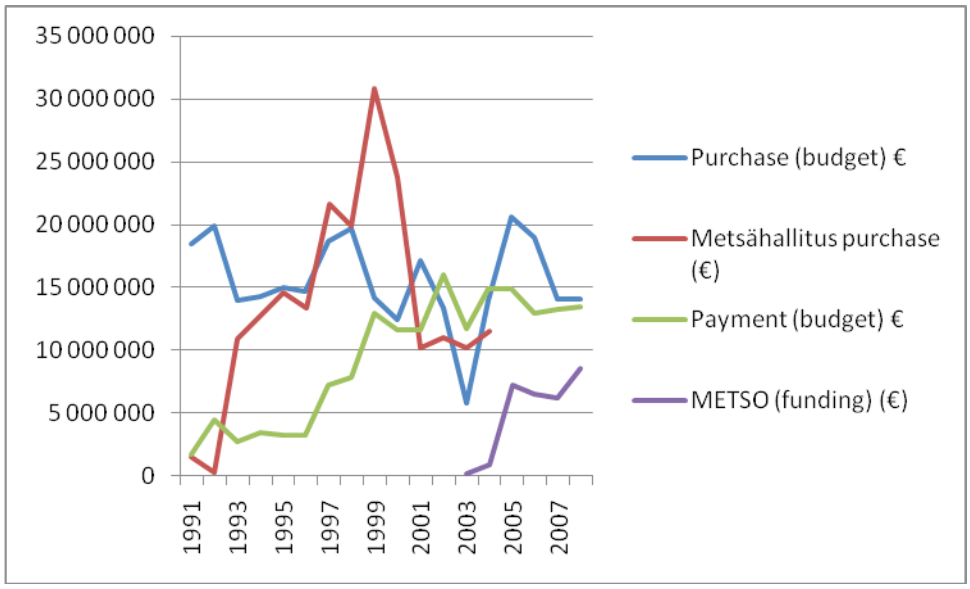

Figure 3. Allocation of nature conservation funding in Finland over the last 20 years (from a personal note from senior forester Pirkko Isoviita, Ministry of the Environment, 18.2.2010). Metsähallitus (the Finnish Forest and Park Service) is a state-owned enterprise responsible for nature conservation areas located on state-owned lands, and METSO is a forest biodiversity programme presented in more detail in Section 2.6.

Economic instruments focused on other actors than just local land-owners – i.e., on municipal and district governments (the local public actors) – that bear opportunity costs of conservation policies (such as the costs of the existence of large protected areas with significant land-use restrictions) have been called **fiscal transfers** (Santos et al., 2011). In Finland, there are no systematic policies for transfers. However, political solutions for new protected areas have often included economic compensation of various forms, such as increasing numbers of work positions and development of infrastructure through financing for buildings roads, in the regions where the most protected areas have been established (Lilja-Rothsten, 2011, p. 4). Currently the municipalities receive forest 'income tax' from the conserved forest areas and their estimated number of tree stumps. Instead of this 'income tax', northern municipality Salla (of whose land area nature conservation areas account for 10%) has proposed that municipalities receive 'real-estate tax' from the state for the conservation areas, which would be more predictable yearly income. Salla's proposal has been met with mixed feelings by the State Forest and Park Service, with declining funding to Nature Services, which is responsible for the conservation areas. It has been estimated that one quarter of Finland's tourism is based on nature tourism, which already creates benefits for the regional economies. For many municipals, the income from tourism boosted by conservation areas is considerable (Finnish Environment Institute, 2002).

3.3 Increasing European funding – LIFE+

Finland has participated in the EU's LIFE financing instrument's programmes since 1995 and has succeeded well in receiving this funding. The current, fourth period for LIFE funding (called LIFE+) runs in 2007–2013. LIFE+, the Financial Instrument for the Environment, is a funding tool giving special support to projects developing and implementing environmental policy goals and legislation of the European Union. LIFE funding can be estimated as covering 7–9% of all nature protection expenditure in Finland.

According to a Finnish study of LIFE funding in Finland, the funding is seen as an important resource for nature conservation projects, especially in environmental administration involving the State Forest and Park Service and in regional environmental administration (Harju-Autti et al., 2010). It enables various kinds of nature restoration activities and investments in small infrastructure items linked to protected areas (e.g., nature paths, bird towers, and exhibitions), alongside project planning and evaluation.

Through to 2009, the only Finnish nature protection NGO that had experience from a LIFE project both as a partner and as a receiver of benefits was the WWF. BirdLife has been a partner in many projects. In Finland, environmental NGOs are so small that they almost always need other project partners if they are to be able to gather their own contribution to the funding (50% of the budget). Usually NGOs work in collaboration with the state's environmental administration. According to the environmental NGOs, they are very interested in projects that could receive 75% of their funding from the EU (especially projects to do with priority species and habitats). In the private sector, LIFE+ has been considered a good opportunity, although it has been thought of as a funding source that doesn't stand out from the other public funding sources. Because LIFE includes serious reporting responsibilities and the benefit-receiver must temporarily fund almost the whole of the project, many small companies and smaller organisations haven't been able to participate. In the private sector, large-scale partnership arrangements usually aren't possible, because most projects have focused on questions that are quite narrowly delimited in technical terms. In the private sector, LIFE projects are usually

linked to a larger business ensemble, for which difficulty is faced in commitment to waiting for funding for one part of the ensemble (the funding for the LIFE project) for an uncertain time. As regional environment administration and many of the state's research institutes have suffered from decreased state funding, it has been hard also for these institutes to find the necessary matching funding for the projects – at least for bigger projects, such as those needing 2–3 million euros in funding. On the other hand, research institutes (e.g., the Finnish Environment Institute and the Game and Fisheries Research Institute) haven't had problems in finding funding, and the same is true for work in the Finnish capital, Helsinki. The Forest and Park Service, responsible for the management of most of Finland's conservation areas, has deemed the 50% rule a challenge, although at the moment the latest conservation funding in Finland – from the Southern Finland Forest Biodiversity Programme – enables finding one's own funds for multiple forest projects at the same time (Harju-Autti et al., 2010).

Because drawing up an application for LIFE funding calls for contribution of months of work, most institutes cannot handle it through the work input of their permanent staff. In Finland, a new person is hired, for drawing up the application. This practice is not easily continued in the current financial situation, in which outside funding is sometimes needed just to sustain normal operations and pay the salaries of the permanent staff. The lead time to apply, which is more than a year, has been seen to influence possible partners' commitment to a project, especially in the case of partners whose budget economy is linked to a calendar-year cycle. These partners include the cities and municipalities. Because the revision stage has in recent years been handled in early summer, when staff is on summer holiday, the short time for responding has been deemed a challenge. If the person hired to prepare the application can be hired with preparation funding, he or she cannot be retained during a lengthy revision stage. Therefore, in the revision stage, the person who has most intimately been involved with drawing up the application might not be available for answering the questions that may arise in the course of further evaluation and processing of the application (ibid.).

In Finland, the LIFE+ nature and biodiversity domain has been considered the most challenging area from which to receive LIFE project funding. Rejections of applications from Finland in 2007 and in 2008 have been based on two rules linked to this area of funding. The LIFE+ rules demand that projects linked to nature and biodiversity target 25% of their activities at concrete nature protection actions. The challenge for Finland has been encountered with projects linked to species with a wide range of movement, such as the Saima ringed seal (*Pusa hispida saimensis*) and wolverine (*Gulo gulo*). Planning concrete action for these species has been difficult on account also of political challenges associated with legal mandates or support for the concrete protection actions. The same kinds of problems have been said to occur in projects intended for protection of bird species nesting in EU areas but for which the most important actions are those for the wintering areas or along migration routes, partly or wholly outside the EU. In Finland, it has been considered very important to face and solve the problems linked to species protection projects, because LIFE+ is deemed to be the most important funding instrument for species protection (ibid.).

Problems occur also because the instructions regarding approved action advancing the consistency and coherence of the Natura 2000 network or other areas have been seen as too open to interpretations. There have been problems related to rules stating that project areas should provide the highest level of protection possible when the project ends. In practice, this means in Finland that the area should be designated as an official nature conservation area. This can prevent inclusion of private lands in projects, because private land-owners might not

always want to sell the area to the state or establish a private conservation area on their own land. Also, taking of a strict line as to what is meant by the required innovation in biodiversity projects has meant a low number of accepted biodiversity-related applications (ibid.).

Regardless of the problems, the will to receive LIFE funding and initiate projects is clear. As presented in the estimates in Table 5, below, the number of LIFE projects is expected to be 10 times greater in 2013 than it was in 2005.

Table 5: LIFE in Finland – estimated numbers of projects and their funding (Harju-Autti et al., 2010)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of projects	4	8	8	4	6	17	25	34	42	46	46
Funding (in M EUR)				1.1	3	5.2	5.5	6.7	8.3	8.7	6

3.4 The continuum of conservation programmes

Among other important governmental guidelines, such as the National Strategy and Action Plan for Conservation and Sustainable Use of Biodiversity, written for 2006–2016 (Heikkinen, 2007), Finnish national nature conservation is governed by the Nature Conservation Act (1096/1996) and the Nature Conservation Decree (160/1997). The act regulates conservation and management of both nature and the landscape. Its purpose is stated as 'to: 1) maintain biological diversity; 2) conserve nature's beauty and scenic value; 3) promote the sustainable use of natural resources and the natural environment; 4) promote awareness and general interest in nature; and 5) promote scientific research' (Finnish Nature Conservation Act, 1996). According to the act, nature can be conserved in various ways on state-owned and private lands. Certain species and their habitats can be protected by law, permanent or temporary nature reserves can be established, and contracts can be made for management or conservation (ibid.). Finnish nature conservation policy is specified in the Nature Conservation Decree (160/1997, amended by 916/1997, 14/2002, and 913/2005), which lists protected species, threatened species, species needing special protection, and species in need of strict protection according to the EU Habitats Directive.

Since the mid-1970s, the core of Finnish nature conservation policy has consisted of 'nature *conservation programmes*', targeting specific habitat categories, launched by the Ministry of the Environment. Finnish nature conservation programmes have involved national parks and strict nature reserves, mires, bird wetlands, eskers, herb-rich woodlands, shores, and old-growth forests. The last extension of a nature conservation programme took place in 1996. Implementation of all programmes is almost complete. The nature conservation programme materials show where conservation areas are to be established. In formal terms, these are not legally binding; in practice, however, almost all areas listed in the programmes are, after many phases, protected as nature conservation areas under the Nature Conservation Act. For private lands, the key instruments are land purchase, land exchange (the owner receives state land in exchange for the land the state wants to conserve), a contract of land-use restrictions against payment, land consolidation, and expropriation.

Figure 4 describes execution of nature conservation in Finland by charting the surface area acquired in state purchases as well as the amount of money available each year for running the programmes.

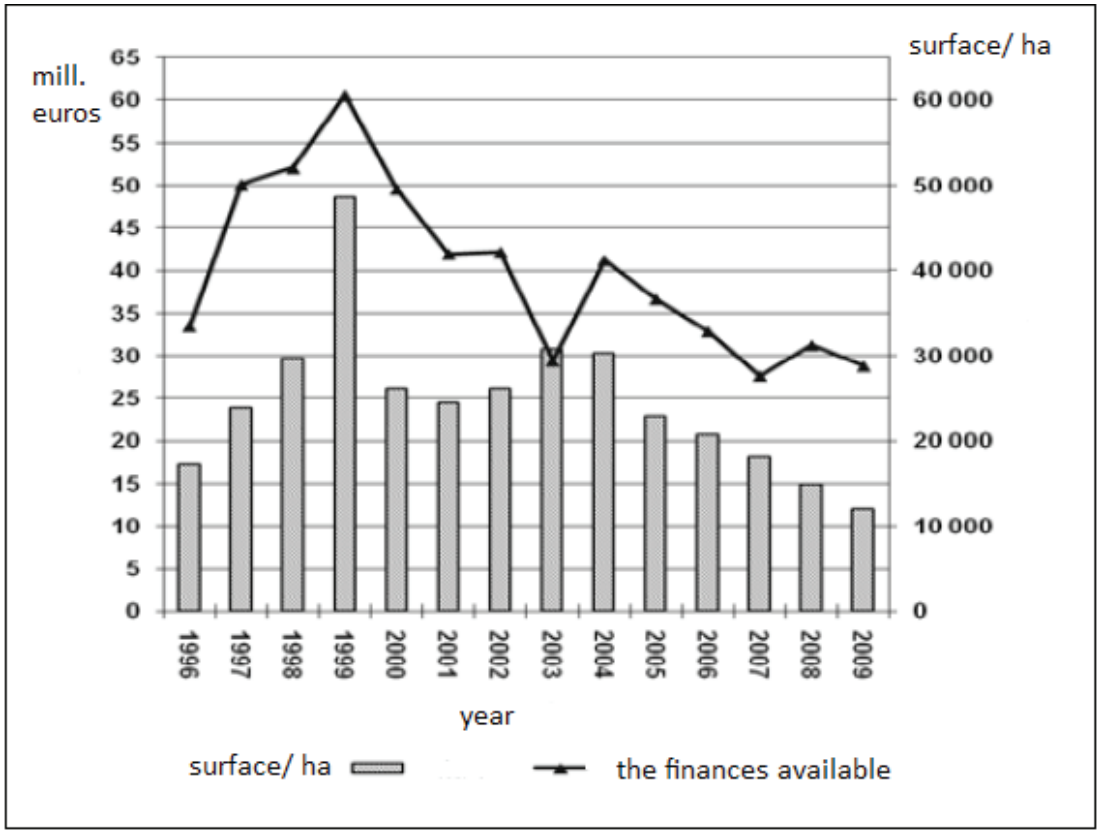

Figure 4. Execution of nature conservation programmes in 1996–2009 (Finnish Ministry of the Environment, 2010d, p. 46).

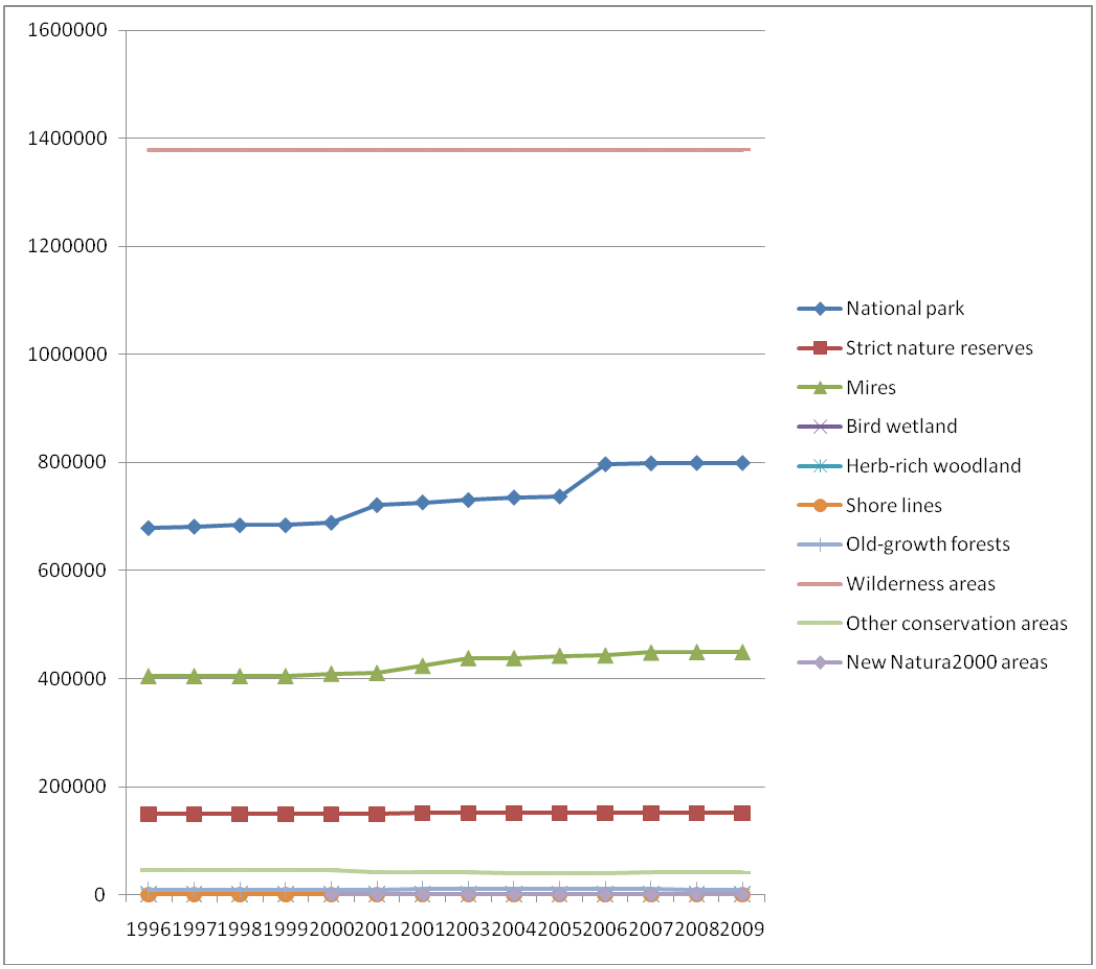

Figure 5. Development of conservation areas established on state-owned lands in Finland (based on *Ympäristöhallinnon toimintakertomus 1996–2003* and *Statistical Yearbook of Forestry, 2004–2009*).

In addition to these central conservation policy instruments, various conservation areas have been established with politically and administratively lighter procedures. The accumulation of established conservation areas on state-owned lands is presented in Figure 5, and the development of conservation areas on privately owned lands is depicted in Figure 6. More detailed information on this history is presented in appendices 1 and 2 (eskers are excluded from these figures and appendices, because protection of eskers is governed by the Land Extraction Act (24.7.1981/555) and the Land Extraction Decree (14.2.1997/160), whose methods of control are very different from those of the Nature Conservation Act). In addition, Table 6 shows the current situation of conservation areas.

The instrument of nature conservation that has been used most often in Finland is the *establishment of official conservation areas*. These conservation areas have been situated most often on state-owned lands but are also found on privately owned land. Until the Nature Conservation Act of 1996 was passed, conservation areas were always established on a permanent basis, but temporary nature reserves became more common alongside them, especially in the first decade of the 2000s. Various new incentive-based conservation instruments have been tested in the Southern Finland Forest Biodiversity Programme since 2002, presented in more detail in Section 3.7. In Finland, *endangered species* listed in the decree are protected and their habitats are not to be destroyed if noticed. In addition, special attention has been paid to charismatic species such as birds of prey, wolves, the Siberian flying squirrel, and the Saima ringed seal, which have been a target of more specific conservation efforts. The conservation of certain endangered species, such as bears, wolverines, wolves, lynxes, and salmon, is governed by the fisheries and hunting legislation.

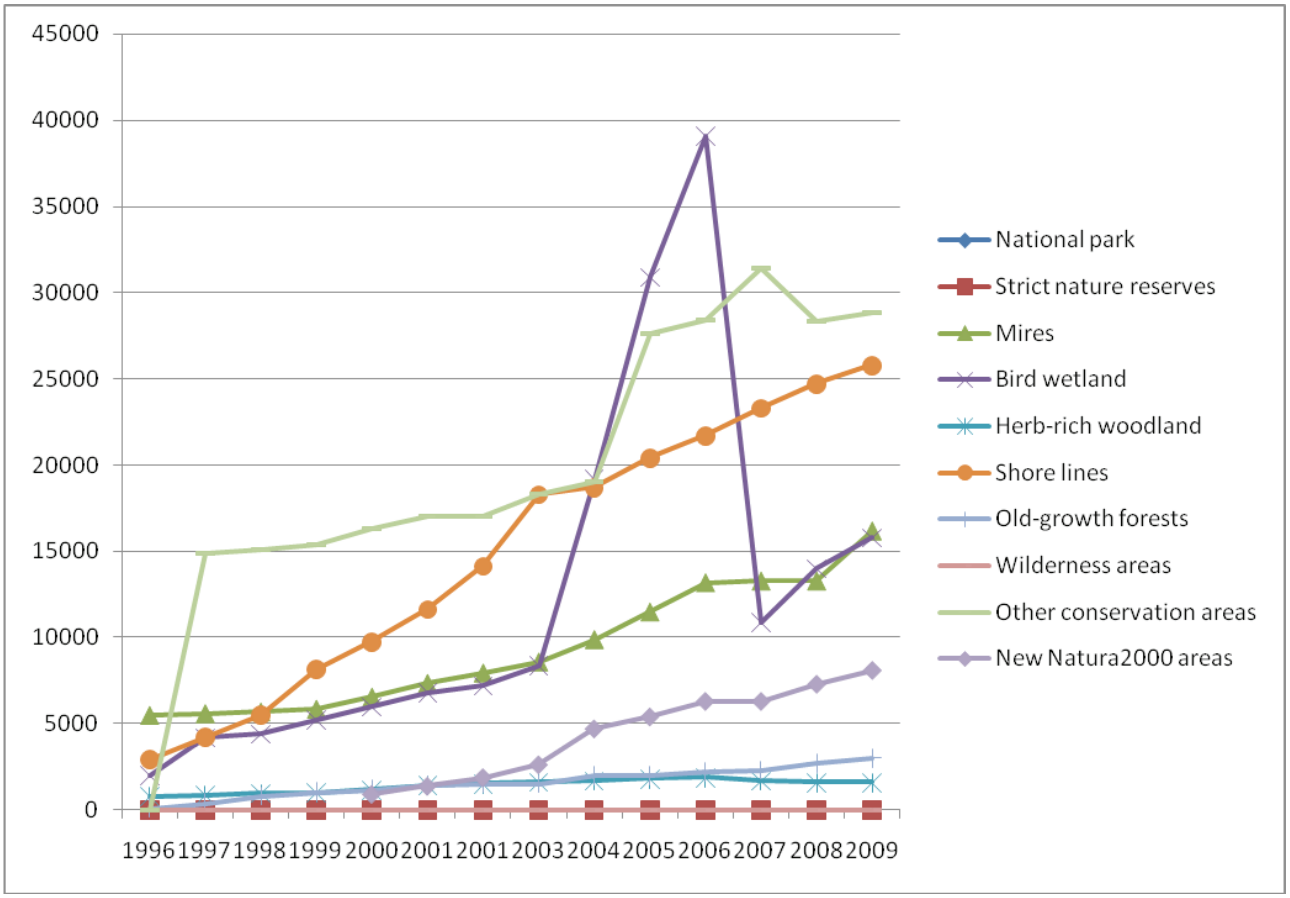

Figure 6. Development of conservation areas on privately owned lands in Finland (hectares of land area, with the exception of water areas being included in the bird wetlands in 2004–2006 (based on the annual reports of the Finnish Environmental Administration (*Ympäristöhallinnon toimintakertomus 1996–2003*) and the *Statistical Yearbook of Forestry, 2004–2009*).

Table 6: Finnish nature conservation areas – status on 1 January 2009 (the total land area in Finland is 30,447,250 hectares), from the Finnish Environmental Administration (2009)

Type of nature conservation area	Number of areas so designated	Area (hectares)	Percentage of Finland's land area
National parks	35	885,300	2.9
Strict nature reserves	19	153,600	0.5
Mires	171	460,400	1.5
Herb-rich woodlands	52	1,200	0.004
Old-growth forests	91	9,400	0.3
Seal protection areas	7	18,800	0.06
Other state-owned conservation areas	39	49,100	0.2
Conservation areas of the State Forest and Park Service	24	800	0.003
Conservation areas on privately owned land	6,466	218,300	0.7
Natura areas among these		8,100	0.03
Conservation areas in Åland	44	12,600	0.04
Conservation areas, total	**6,948**	**1,809,500**	**5.9**
Wilderness areas	12	1,489,000	4.9
Total	**6,960**	**3,298,500**	**11**

3.5 Progress in site selection

3.5.1 Location of the conservation sites

Figure 6 presents the conservation and wilderness areas of Finland, while Figure 7 shows the location of Natura 2000 areas. One can see from these maps that the largest conservation areas are in the northern part of the country. These areas include wilderness and the largest national parks. In the southern part of the country are the smaller conservation areas included in the national conservation programmes, described and presented in figures 7 and 8.

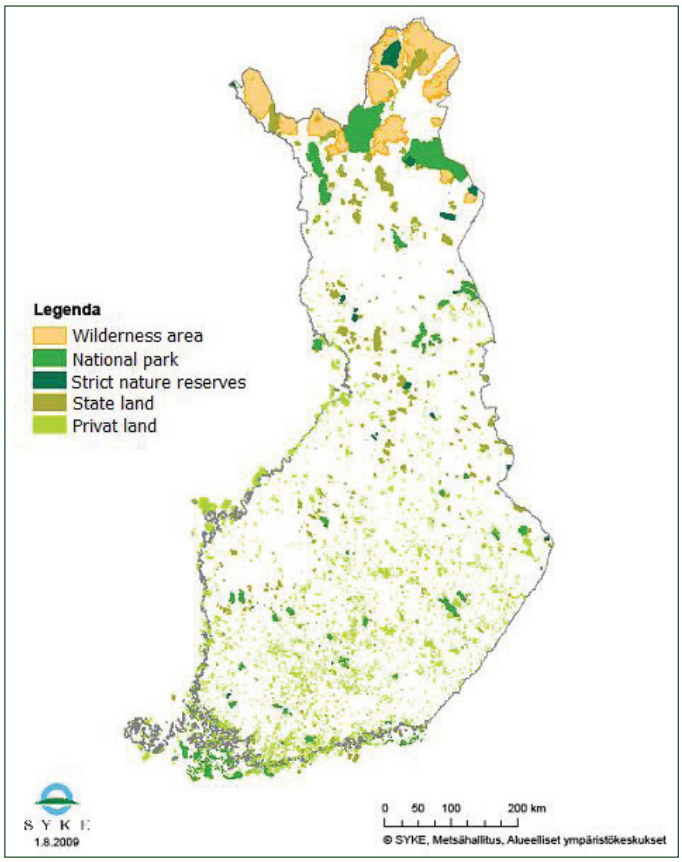

Figure 7. A map of the conservation and wilderness areas established in Finland.

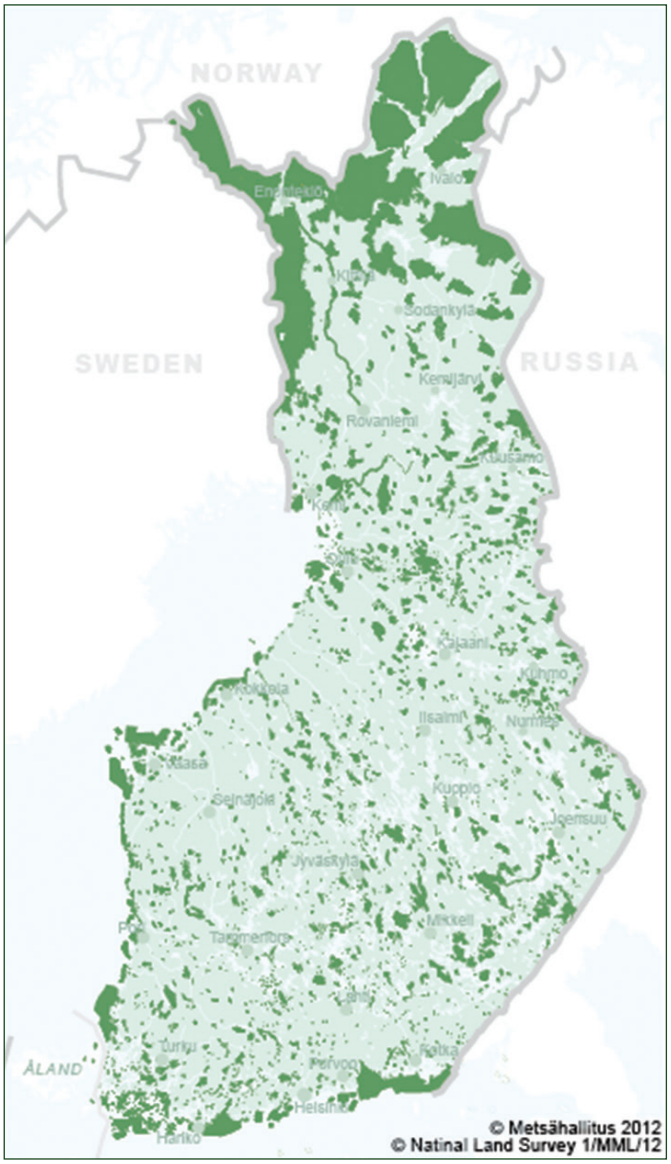

Figure 8. Finnish Natura 2000 areas (Finnish State Forest and Park service, 2012). The majority of the conservation areas are on land owned by the state, where wilderness areas, national parks, mire protection areas, and strict nature reserves account for the greatest proportion of conservation area. These areas are mainly situated in the northern part of the country. On privately owned lands, the majority of the conservation areas are shorelines, mires, and bird wetlands. All newly established Natura-2000-network areas are found on privately owned land. At the beginning of 2009, Finland had 8,100 hectares of new Natura 2000 areas on private lands, which is 0.03% of the country's total land area (see Figure 6 and Table 6).

Over the last few years, the Finnish Forest and Park Service has established 10,000 hectares of new forest conservation areas on state land in the forest biodiversity programme for southern Finland (METSO) and has been encouraging fire management and increase in the amount of decaying wood on the forest sites (Koskela et al., 2010). New conservation areas have begun to be created on privately owned lands also, in a temporary mode departing from the main path of earlier efforts but also in the familiar permanent mode. New conservation efforts on privately owned lands are based on payments and compensation. In earlier nature conservation programmes, the compensation was received mainly for the land chosen by the administration, not for the land offered by the owner.

Figure 9, in turn, compares the state of implementation of the Habitats Directive in Finland with that in other member countries of the EU. The figure shows good progress for Finland, even though the numbers for Greece, the UK, and Sweden seem to be even better.

In addition, in Figure 10, we present a map of the Fennoscandian Green Belt. This green belt extends the scale of nature conservation in Europe across the Russian border. It is relevant in that natural boundaries do not respect the borders of administrative zones. Therefore, co-operation beyond the European Union is required (see the discussion of LIFE funding in Section 3.2).

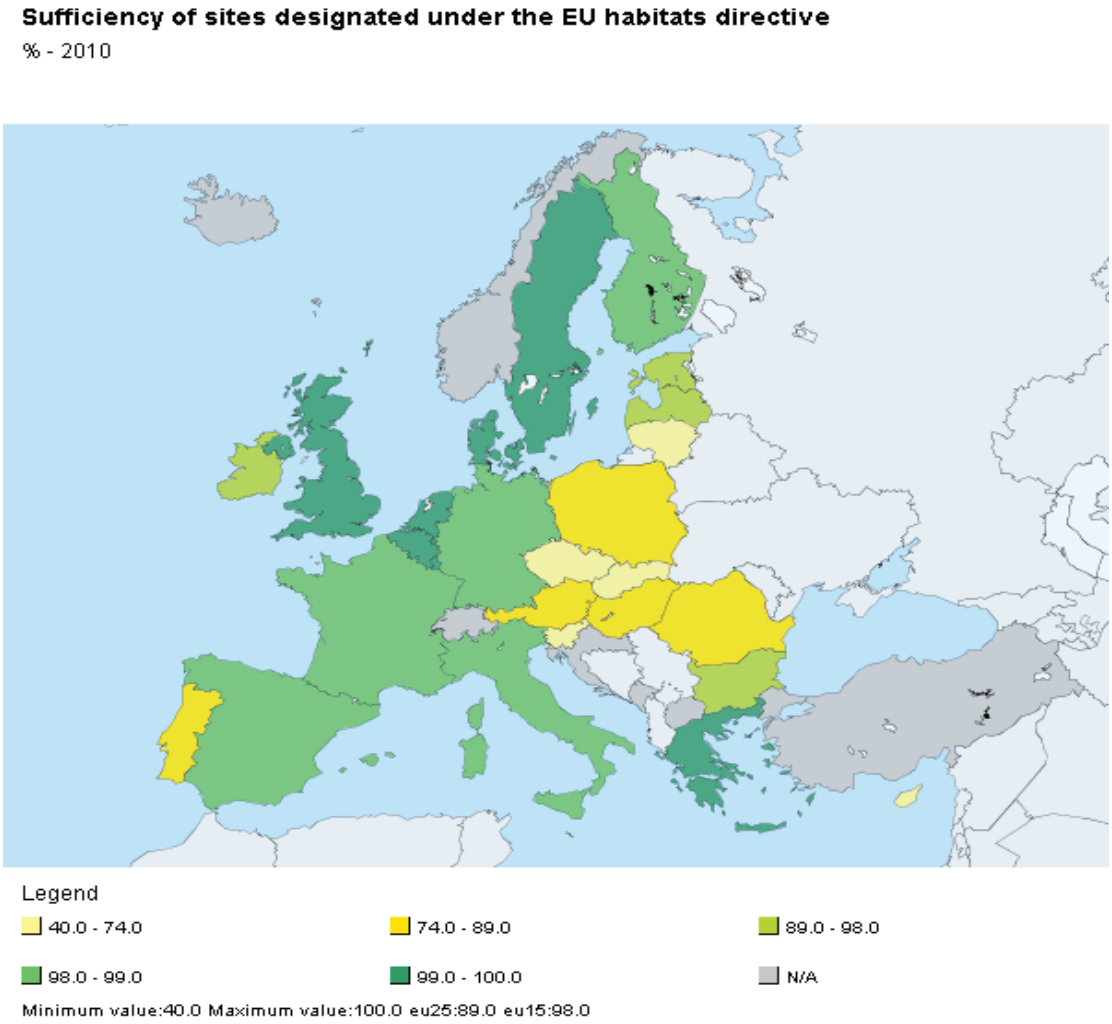

Figure 9. The index of sufficiency of Member States' proposals for sites designated under the Habitats Directive (percentages) (EUROSTAT, 2011).

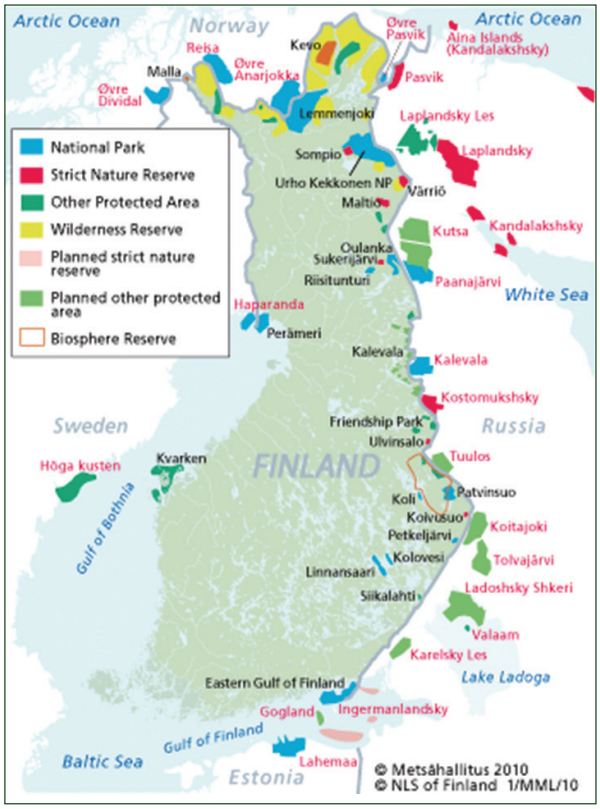

Figure 10. The Fennoscandian Green Belt – conservation co-operation between Finland and Russia (Finnish State Forest and Park service, 2013).

3.5.2 Changes in site selection criteria

The establishment of official conservation areas was an outcome of large-scale nature conservation efforts, which began in the 1960s on the basis of inventories of nature and regional strategic planning. The aim in conserving these areas was to conserve a representative set of Finland's habitats and geographic areas (Borg & Ormio, 1978, p. 49; Massa, 1994, p. 258). The site selection was often based on multiple scoring criteria, an example being the selection of sites for the programme for old-growth forests. However, the application of this method has since been questioned – for example, by Kaija Virolainen (1999) on the basis of testing of multiple options for selecting and evaluating conservation areas in view of data on boreal mires, semi-natural grasslands, herb-rich forests, old-growth forests, and boreal lakes, by means of several taxa and with application of varied biodiversity measures. She found scoring procedures to be generally less efficient than heuristic methods and optimising algorithms. In her comparison, the multiple-criteria procedure was the least effective. A heuristic method emerged as a good option when a listing of sites in priority order is needed, and precise optimisation algorithms seemed to find optimal solutions to the reserve selection problems. This study has been said in addition to highlight the necessary trade-offs that need to be considered in conservation of areas on the basis of particular taxa. Currently done in co-operation between a university and the Forest and Park Service, the conservation optimisation is based on the Zonation algorithm, which estimates the conservation value of individual sites on the basis of their connectedness (Lehtomäki et al., 2009).

In 2008–2009, METSO had about 13,700 hectares under strict protection. This includes formerly state-owned commercial forests (10,000 hectares) and areas offered voluntarily for protection by land-owners (3,700 hectares). The Forest and Park Service selected the 10,000 hectares of new conservation areas by means of the above-mentioned Zonation algorithm. When analysing the status of connectedness of potential new conservation areas, researchers have utilised many existing data from the databases of environmental administration entities, the Forest and Park Service, and the forestry administration. In addition, a stakeholder group consisting of local, regional, and national experts in biodiversity conservation and forest inventory have set criteria and rules for evaluation of the data gathered.

It is worth noting that the selection of conservation areas has not been based on ecological factors alone. First, the conflict between intensive natural resource management and nature conservation has affected conservation areas' selection; mires and underproductive forests of northern Finland have been easier to conserve than have fertile, productive, and accessible habitats such as old-growth forests or herb-rich forests in southern Finland. Second, in extension of this argument, that nature conservation has focused on the northern part of the country, far from the urban Southern Finland, and even on the traditional lands of the Sami people, indicates that also cultural, historical, and political factors have had a considerable effect on the selection of sites for the largest nature conservation areas (Massa, 1994, p. 261). With Southern Finland's forest conservation programme (i.e., METSO), attempts are being made to address the conservation shortage in the southern part of the country.

In Finland, conservation decisions and associated efforts have not all been easy and smoothly implemented. In particular, conservation efforts targeting shorelines and the white-backed woodpecker came into marked conflict with social representations of the preferred land-use practices of Finnish land-owners and raised several conflicts in the southern parts of the country in the 1990s (Nieminen, 1994; Jokinen, 1998). As the Natura 2000 implementation

took place directly thereafter, the conflict between land-owner autonomy and administrative-scientific nature conservation did not ease; instead, it accelerated (Hiedanpää, 2005). Site selection for new conservation areas has been particularly polarised between those representing land-owners and management (e.g., forestry) and those representing ecological and environmental authorities (Rantala & Primmer, 2003; Paloniemi & Tikka, 2008). An option for temporary nature conservation contracts was introduced in the Nature Conservation Act of 1996, in order to make some conservation decisions lighter and easier. After the Nature Conservation Act, in response to the loud criticism of centrally designed site selection, the recently established Southern Finland Forest Biodiversity Programme (Finnish Government, 2002) emphasised land-owner initiative, which yielded sparsely distributed – yet ecologically rather valuable (Mönkkönen et al., 2009) – habitats for protection (Finnish Government, 2008). With METSO, the emphasis in Finland was shifted to selection of habitats on certain ecological criteria but on a voluntary basis. In other words, as an outcome of the METSO process, the role of ecological knowledge has moved from dominance of ecological knowledge and a top-down conservation approach to placing greater value on lay knowledge and private land-owners' interpretation of local ecological state. Counselling of land-owners on the possible conservation value of their land, provided by forest administration professionals, is seen as another important part of the METSO programme. Lay knowledge of the biodiversity values of one's land does not, however, dominate in the decision stage: before official conservation decisions, sites are evaluated on the basis of ecological criteria agreed on at the start of the programme and fine-tuned as it progresses (cf. Paloniemi & Varho, 2009). While the passing decades have brought changes in forest biodiversity conservation (incl. in the time that receives the focus in this report), we draw our conclusions on the history of site selection and policy tools from the perspective of the sector of biodiversity conservation described in Table 7.

Table 7 presents a general timeline for Finnish forest conservation by describing selected sites and conservation tools. The principles behind site selection have varied through the decades. In line with rising environmental concern, in the 1960s ecological principles for site selection were established, and the '90s saw questions of forest-owners' rights and their protection by law discussed, while efforts have been made since 2000 to attract land-owner participation with monetary and social encouragement to be an active environmental citizen. The '90s can be seen as a period of many new conservation tools, and the EU's impact on Finnish nature conservation is evident as well. The conservation tools of the '90s include nature-type-based areas, which protect smaller nature types than do the conservation programmes and which are established every time the administration delimits the (usually small and rare) nature types on an official map and delivers the decision to land-owners in the area. The nature type protection set forth in the Nature Conservation Act covers nine nature types, whose characteristic attributes the delimitation is an attempt to protect. These nature types include broad-leafed woods, hazel woods, black alder swamps, sandy shores, coastal meadows, dunes, juniper meadows, wooded meadows, and large trees and tree groups in open landscapes. The nature type conservation does not lead to the state buying land from its owner: the owner can use the land after delimitation, in ways that do not endanger characteristic attributes of the nature type. Also, a land-owner can apply for exception from nature type protection or receive compensation for the economic losses caused by the protection if exception is not granted and economic loss results. There is, however, a threshold of considerable loss set forth in the compensation rules: a land-owner does not receive state compensation for his or her economic losses if they do not rise above the limit for being deemed 'considerable losses'.

Table 7 also, interestingly, shows how a strong command-and-control (C&C) type of nature conservation has received a response of objection from society, leading to development of means more easily tolerated by land-owners. Examples of these developments are land exchange (when heavy objection arises to expropriation) and voluntary and temporary means of forest conservation.

Table 7: Site selection and policy tools in forest protection

TIMELINE	Sites selected	Tools
Early 1900s	Scenic and tourist attractions	Crown parks and the state acquiring land in general parcelling out of land
Late 1900s – early 2000s	Sites of interest for early pioneers of nature conservation	State purchases and agreements between municipalities and local nature conservation societies
1920s	Sites of interest in the eyes of forest researchers and the state's forest administration	The Nature Conservation Act, state and forest administration purchases, and expropriation by the state
1930–1950	Fell areas, large northern areas, and upgrades to areas already acquired	Land exchange to improve areas already acquired (expropriation not in use, given strong objections) and instruments under the Nature Conservation Act (national parks and strict nature reserves)
1960s	New national parks to compensate for parks lost in war, various forest types and mire nature, nature typical of various bio-geographical regions, scenic nature, and sites proposed by societies of natural science and forest science	National parks and strict nature reserves, and old-growth forest areas chosen by the state´s forest administration
1970s	Site selection based on large-scale national inventorying of nature	National conservation programmes and zoning of parks
1980s	Selection based on earlier proposals and inventories, conservation programmes by bio-geographical region, and protection of wilderness areas	National conservation programmes, state purchases of private lands belonging to conservation programmes, and the Wilderness Act
1990s	Old-growth forests on the sites recognised in old-growth forest inventorying done in co-operation between a nature conservation NGO (the Nature Conservation Union) and the administration, and via indicator species for valuable sites	A new Nature Conservation Act, covering smaller nature types protected when first delimited by the administration; a new Forest Act, including nature types protected when felling operations occur; nature types also in the Water Act; the EU Habitats Directive, with the Natura 2000 network and protection of resting and nesting areas of the directive's strictly protected species; negotiation between forest administration and conservation NGOs; and Area- Ecological Plans in state forests
2000s	Conservation of forests in Southern Finland where the conservation areas are scattered and small, with expert groups setting biological criteria for conservation	Southern Finland's forest biodiversity programme (i.e., METSO) and its voluntary/temporary options

3.6 Different approaches to connectivity

3.6.1 From conservation areas to landscape connectivity

The importance of ecological connectedness in consideration of the European Union's biodiversity conservation efforts is widely recognised. Ecological connectivity is considered a target that calls for measures of support in the EU Biodiversity Action Plan. Also, the Birds Directive and the Habitats Directives include connectivity aims for protected areas and the wider environment (Kettunen et al., 2007, pp. 1–6). For our report, we analysed current Finnish biodiversity strategy as well as the most recent evaluation of the Finnish Nature Conservation Act and stakeholder comments on the connectivity question approached in the evaluation, in order to see how the Finnish conservation regime interprets the target of connectivity.

As Finnish conservation areas are mostly concentrated in the northern part of the country, the forest species and habitats of the northern boreal zone have frequently been evaluated as protected better than the southern ones in Finland (e.g., Working Group..., 2000); accordingly, their connectivity is better, because northern conservation areas are much larger and the landscape structure is different from that in the South. However, because climate change is fastest near the poles, climate change probably poses a particular threat to northern species and habitats and changes their dynamics.

In Finland, there have been evaluations concentrating on the connectivity theme, which can be thought of as important also in connection with ongoing conservation efforts, as connectivity is among the ecological criteria in Southern Finland's forest conservation programme, METSO. The criteria take into account the proximity of the new potential conservation area to the conservation areas already established.

Joona Lehtomäki et al. (2009) have evaluated the state of connectivity of those nature conservation areas in Southern Finland where the METSO programme tries to build more conservation areas in order to give balance to the Finnish conservation-area network. The Southern Finland connectivity analysis applied four components in measurement of the connectivity of new sites that could be conserved within the conservation programme. The measurement was based on the following criteria for sites: 1) of high quality locally and well connected internally, 2) well connected with high-quality forests in their surroundings, 3) well connected with existing conservation areas, and 4) large enough to be ecologically effective. The analysis produced a systematic mapping of areas with high conservation value across southern Finland and found that forests on privately owned land in Finland generally had more conservation potential than those on state-owned lands. As the connectivity evaluation study verifies, there are several aspects of connectivity. Accordingly, different measures and tools can be meaningful in the case of attempts to increase connectivity or to mitigate consequences of fragmentation arising from infrastructure developments and land use.

Current Finnish biodiversity strategy mentions ecological connectivity related to the United Nations Convention on Biological Diversity and said convention's goals. The Finnish strategy mentions the convention calling for uniting all national conservation areas and conservation-area networks more broadly with the rural and sea areas and with appropriate fields of operation, applying an ecosystem approach to conservation work and taking care of ecological connectivity. The strategy approaches ecological connectivity mainly in terms of

connectivity of conservation areas and the connectivity of the conservation network (Finnish Ministry of the Environment, 2007b, p. 85). The current strategy does not define ecological connectivity very precisely; it leaves room for interpretation.

The evaluation of the Finnish Nature Conservation Act defines connectivity as a target of the national conservation regime – this time, though, as a target coming from the European Union (Similä et al., 2010, p. 7). The evaluation looks at connectivity in different ways. For example, connectivity of the whole conservation-area network and the regional connectivity of conservation areas are mentioned (ibid., p. 51), as are connectivity of biotopes and landscape connectivity. Connectivity denoting structural connectivity of a habitat as well as the functional connectivity of different habitats (Kettunen et al., 2007) is discussed in the evaluation briefly. It approaches connectivity also from the angle of conservation areas and their surroundings (Similä et al., 2010, p. 59). The evaluation states that larger conservation areas might not be vulnerable in the same way to actions outside the areas as small conservation areas, so large areas better protect the characteristic values of nature and help the species population within the area to survive. Individual conservation areas are normally small in Southern Finland; accordingly, the surroundings are important when connectivity in the South is considered.

The evaluation concludes that there aren't yet efficient means in the Nature Conservation Act or the Forest Act to govern the problems created by fragmentation, although practice can pay attention to the fragmentation and connectivity approaches when conservation tasks are directed. The evaluation also states that it is evident that the conservation-area network in Finland can never be so extensive and tight that the target of connectivity could be reached through adding of more conservation areas to it. The evaluation names instruments that should be used to support connectivity enhancements:

1) Land-use planning instruments that could cover large landscapes should be used in accordance with the participatory principles laid down in the Land Use and Building Act.
2) An act for financing sustainable forestry and its environmental subsidies can be targeted at enhancement of connectivity.
3) Agri-environmental schemes and their subsidies can target connectivity enhancement.
4) Administrative decisions concerning land use should take nature conservation into greater consideration than before, and work on conservation aims should be co-ordinated between administrative sectors.
5) National city parks including natural and cultural areas can enhance connectivity within cities with management plans that take connectivity into account. These are considered to be a locally good but nationally limited tool.

The evaluation takes into account that, because areas important for nature conservation often remain outside the scope of planning, the planning procedures may not increase connectivity. Very often only those areas that are protected under the Nature Conservation Act are marked in the plans, and normally no other procedures that might be needed for improving the state of nature or connectivity are discussed. In some municipalities, planning has been used actively to retain the conservation values. Despite the shortcomings of the Finnish planning institution, it was viewed as a tool that could be important for connectivity improvements because the planning process enables examination of extensive areas at the same time. As the Land Use Planning and Building Act allows the regional (county)

plans or the composite master plans to meet national goals for land use, connectivity can be accounted for by law in the planning procedure already, because national land-use goals consider the valuable and sensitive sites and their biodiversity while also enabling ecological connections between conservation sites and other valuable nature areas. The reasons planning has been invoked only partially to advance biodiversity conservation goals was thought to be conscious choice in the municipalities, lack of expert knowledge, lack of funding, or worries about the economic impacts of planning for biodiversity.

The Finnish Environmental Protection Act was said not to take into account harm or diminishment in biodiversity in the same manner as it guards, for example, groundwater that is not to be polluted. Although the Environmental Protection Act refers to the Nature Conservation Act (§41), the relevant provision in itself does not make any claims as to content in granting of an environmental protection permit. This means that if the regulation affecting a certain nature conservation area or the site protection regulation in the Nature Conservation Act does not create obstructions to an environmental permit, nature and biodiversity can be considered only if the nature values of a special site are in danger of being ruined or of contamination.

National city parks, on the other hand, were thought to be able to answer to the connectivity need well, because one criterion for ability to set up a national city park and get approval from the Ministry of the Environment is ecology and continuance. By 'continuance', the criteria refer to ecological corridors that make it possible for species to move and to interact. Also continuance meant that the area of the city park should be continual and should connect without a clear border to natural areas outside the city or to the countryside outside the city (Similä et al., 2010). At present, there are five national city parks in Finland – in Hämeenlinna, Heinola, Pori, Hanko, and Porvoo.

Subsidies for sustainable forestry and agri-environmental choices could be used to support connectivity. The subsidies for sustainable forestry were thought already to make connectivity enhancement possible, if enough resources are poured into their direction and into the creation of sufficient knowledge for evaluation of the connectivity needs in forests (ibid.).
The evaluation stated that, to make connectivity work and deal with connectivity problems, it is important to produce meaningful information from large areas and means to use that information on the scale of a property or a project. It was opined that the steering system already has many tools that could be used for connectivity enhancement that should be developed further in that direction. Meaningful schemes that could enhance connectivity were stated to be the general scheme for biodiversity at the level of the regional Centres for Economic Development, Transport and the Environment and the regional scheme for forestry (ibid.). When the evaluation of the Nature Conservation Act was submitted for its official statement round, the connectivity issue was addressed via various kinds of thoughts about what connectivity means (Finnish Ministry of the Environment, 2010c). At least the following definitions of connectivity can be found in the statements:

Connectivity of habitats suitable for a species looked at through the lenses of species properties, means of movement, and the conditions of living that are vital for the species
Landscape connectivity (ecological connections within landscapes)
Connectivity of the conservation sites (a site's connectivity to the landscape outside the site)
Connectivity of larger and smaller sites (site enlargement and buffer zoning and sites in comparison to each other – how the connectivity of smaller sites can be improved and whether bigger sites are generally more in line with the principle of connectivity)

General connectivity of nature conservation areas (ecological and local connections of the conservation-area network)
Connectivity and transportation routes – mitigating transportation route influences, enabling species movement, and studying mitigation measures' efficiency
Connectivity in conservation of large biotopes and habitats, and connectivity as conservation of ecological entities
Connectivity in agricultural and forestry subsidy policy (what kinds of sector-level means exist to take connectivity into consideration)
Whether connectivity enhancement is the same as blocking fragmentation
The connectivity of similar nature types, biotopes, or habitats (connectivity for specialised species)

3.6.2 Landscape ecological planning – a tool for increasing connectivity on state land

The development of landscape ecological planning in Finland started in 1994 as a project of the State Forest and Park Service and the Finnish Environment Institute (Hallman et al., 1996). The initial planning was partly influenced by ideas adopted from Swedish research on the topic. Also, the Forest and Park Service used a working group of specialist researchers and interest-group representatives to support the development of landscape ecological planning, which has developed over the years since these first applications (Karvonen, 2000, p. 7).

The Finnish Forest and Park Service carries out landscape ecological planning for state-owned land. These plans are attempts to view extensive forest areas as a whole, including managed forests, nature conservation areas, and areas for recreation use. Landscape ecological planning of forests is aimed at covering ecological, forestry, multiple-forest-use, and nature-based livelihood goals simultaneously. The planning objectives can include assuring survival of the area's native species as viable populations, ensuring the evolving of new valuable habitats or conservation of existing ones in the area, supporting favourable conditions for the spread of different species, or (for example) complementing existing nature conservation areas. In addition, the planning includes inventories of game habitats; scenic values; and cultural, educational, and research sites and consideration of reindeer husbandry and recreation needs in the plans (ibid., p. 8). If the planning area forms an extensive coherent area, a suitable size is between 50,000 and 100,000 ha. In the case of fragmented forest areas, the Forest and Park Service may collaborate with other land-owners. Also plans can be made for smaller areas, such as those of 2,000 to 3,000 ha. The target with the planning area is to encompass ecological entities as demonstrated in Figure 11 (ibid., p. 10).

Figure 11. Schematic view of the Landscape Ecological Plan and its objectives. In areas where forest use has been intensive, measures should concentrate on certain parts of the area (e.g., the biodiversity enhancement areas) (by Karvonen, 2000, p. 9; Finnish Forest and Park Service, 2000).

Information on the area is gathered as a basis for the plan. This includes basic information on different land uses; recreation-related routes; and constructions in the area and information on assessment of the soil and bedrock, waters, forests, and peatlands. Also, existing data on sites of special value are compiled. Sites of special value include sites on which threatened species have occurred, sites that have been mapped as key biotopes, and other valuable habitats, as well as sites important for game management, research, culture, and nature-based livelihoods. The potentially valuable sites where field inventories are carried out are chosen from the information on the location of valuable sites gathered in the earlier phases of the plan development. In the selection of valuable sites, administrative geographic information system (GIS) data, maps, earlier ecological inventories, and information gained from participatory planning may be used (Karvonen, 2000, p. 12). During the field inventories, the correctness of land-use data is checked and biodiversity-indicating species and biodiversity-indicating structural features of terrain and habitats are assessed. At the same time, the question is raised of whether the valuable site falls under the biotope protection of the Forest Act or Nature Conservation Act or of protection by some other act. Need for restoration is decided upon and deadwood and retention tree inventorying performed. If threatened species are identified, a card is filed for their database, referring to the category of the species and the level of the statutory protection measures.

Marking of the sites of interest for management and the gathering and maintaining of information referring to the sites are based on the forest stand technique – the technique utilised in forestry. Valuable sites that have their own silviculture requirements are marked as separate stands in the plan. Some features may be defined as mere spots on the map (e.g., cultural sites or occurrence of species), while features to be preserved in the case of an extensive valuable landscape are marked as sites including several stands. Information gathered from the stands is kept in the geographic information system of the State Forest and Park Service. Ratings are given to certain 'biodiversity-indicating features' of the stand, and there is special software for calculating the value of individual stands. A list of stands in value order is produced. The rating results are used when the sites to be conserved are chosen, but sites can be chosen for evaluation or conservation in other ways also.

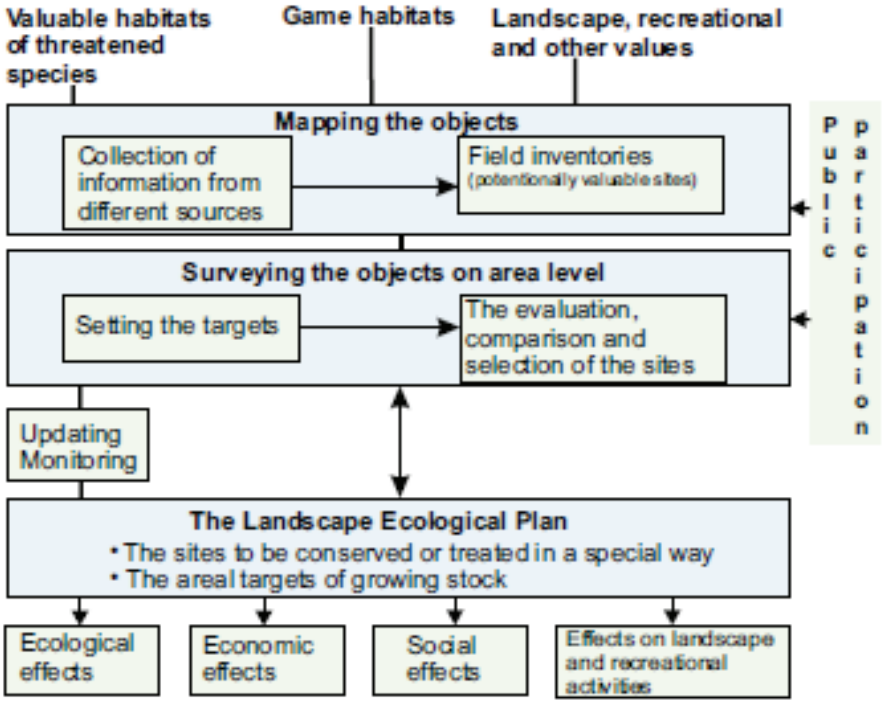

Figure 12. The procedure of landscape ecological planning (by Karvonen, 2000, 15; Finnish Forest and Park Service, 2000).

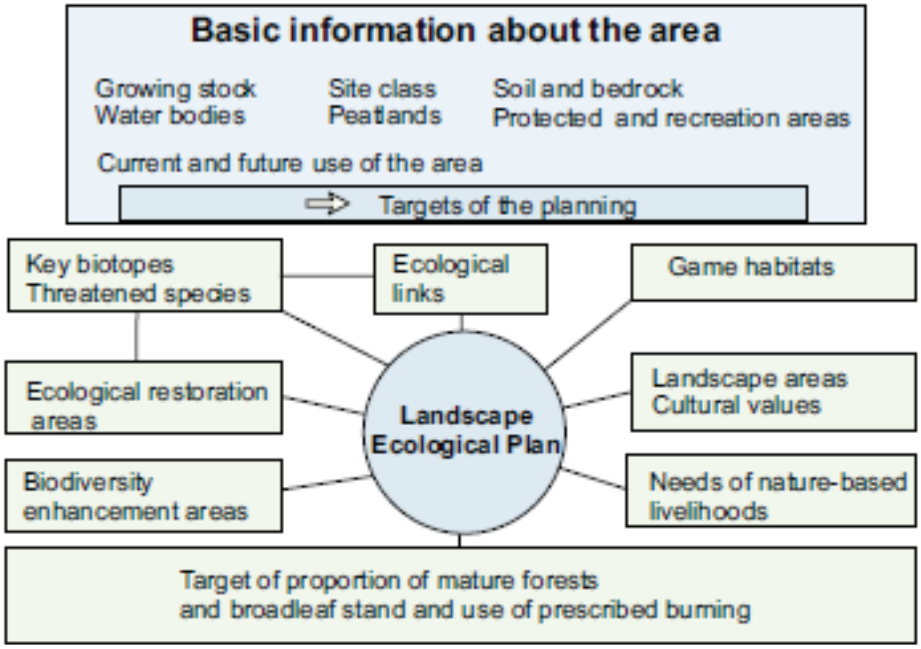

Figure 13. The structure of a Landscape Ecological Plan (by Karvonen, 2000, 16; Finnish Forest and Park Service, 2000).

It is important to note here that the State Forest and Park Service's landscape ecological planning is filled with choices throughout the plan development, which might lead to not noticing something in nature or to not noticing something important for the public. Because the only areas visited are those that are actually chosen for purposes of improving the planning, things left outside them might not get noticed. Ecological entities have to be delimited in the plan, and their borders have to be drawn if stands are to be used as the way of organising the knowledge of various types gathered. Also, while the participatory element in the development of Landscape Ecological Plans is voluntary, which perhaps can speed up the planning process, something of public interest could be omitted from the plan. Nonetheless, Landscape Ecological Plans seem to allow the incorporation of connectivity aims into forest management for state land, because the planning aim could be to support favourable conditions for the spread of different species or possibilities to complement existing nature conservation areas. It also seems that landscape ecological planning allows some incorporation of ecological time scales into the tool, as one of the aims can be to ensure that new valuable habitats evolve in the area of the plan.

3.6.3 General plans for biodiversity of agricultural areas – a possible tool for increasing connectivity on agricultural land

General plans for biodiversity of agricultural areas are another possible tool for increasing connectivity. These plans, financed by the Ministry of Agriculture and Forestry, have been made since the beginning of the 21st century. The planning area is viewed as an area from which the sites important for biodiversity are sought before guidelines for steps toward their management and restoration are given. The general plans can be made for the area of a village or a few villages situated close to each other or, for example, for the landscape areas that are valued as nationally relevant.

Following the management and restoration guidelines in the general plans is always voluntary. The general plan can be used as a foundation when applications for scheme incentives are being prepared for specific areas intended for management. The making of the general plans has included co-operation with local farmers; municipal and city administration; the

Centres for Economic Development, Transport and the Environment (the state's regional environmental authorities); and agricultural expert organisation Pro Agria and the producer associations. Also villagers from the planning areas have been included in the plans' preparation: they are allowed to evaluate the scenic and landscape values of the area, the changes that have occurred, and the development needs (Keski-Suomen ELY, 2011).

In the plans, the biodiversity areas, both known and newly found, are mapped by habitat type. Each area is then described and management instructions are prepared. The plans may include, for example, voluntary general directions for yard-keeping that imitates meadow conditions applicable to all yards of new buildings as well as to the treatment of old yards in a village area (Horppila-Jämsä & Suominen, 2004, p. 60), but they can also describe precise, small micro-environments such as a certain patch of meadow near an old stable, with that patch's plant species. Many of the special areas included in the plans are border zones of fields and forests, banks, and smaller patches. One plan might include, for example, 70 target areas and cover a total area of 50 ha (Horppila-Jämsä, 2005).

It seems possible that these plans could be used as a basis for connectivity planning as well. However, at the moment they seem to be directed to cultural landscape aspects as well as to management directions and to the knowledge base for application for agri-environmental scheme money rather more than to creating connections between habitats listed in the plans. Although spreading of species and increasing favourable conditions for them by human nature management means such as expanding the meadowland environments beneficial for butterflies can be viewed as supporting connectivity, connectivity aims are not voiced very directly and perhaps need time before they start emerging in the general plans.

3.7 Trends in monitoring

Biodiversity monitoring projects aim to collect data about ongoing changes in ecosystems, species, and gene pools. The focus may be on the abundance and distribution of specific subject species, populations, or communities, or on other factors related to their status. The changes under assessment may be natural or anthropogenic. Finnish monitoring recognises various natural resources (water, atmosphere, forests, animals, plants, mushrooms and berries, and cultivated soils) and pressures (water use, regulation of lakes, wastewater loading, air emissions, wastes, land use, extraction of gravel and rock aggregates, and the use of chemicals). Thus the state of the environment is evaluated from the perspective of water, air, forests, biodiversity, radioactive substances, harmful substances, and integrative environmental monitoring (Finnish Environment Institute, 2006). The data collected in the monitoring are used in the data systems of the Finnish Environmental Administration (Hertta environmental information system and VAHTI compliance monitoring data system). In addition, environmental accounting and sustainable development indicators are used.

The monitoring of Finnish biodiversity conservation has been managed at national and regional levels of environmental administration. The arrangement of monitoring has long been the responsibility of the Ministry of the Environment. The Finnish Environment Institute co-ordinates national biodiversity monitoring schemes and conducts these schemes in co-operation with regional environment authorities, working in Centres for Economic Development, Transport and the Environment (Finnish Environment Institute, 2008c). In addition, various other government institutions, non-governmental organisations, and volunteers participate in biodiversity monitoring (more details can be found in Appendix 4). The Finnish monitoring

regime is formed by various stakeholders, representing a mixture of governance levels and sectors. Many of the 'volunteers' are, in fact, professionals contributing to the monitoring beside their official work or are enthusiastic amateurs with a long history in, for example, bird watching. In Finland, biodiversity conservation policy has adopted ideas generated by the research community that are more or less linked to the standardised official monitoring (Vuorisalo & Laihonen, 2000).

The guidelines for the state's monitoring are presented in the Ministry of the Environment's strategy for environmental monitoring. The latest strategy is for 2009–2012 (Finnish Environment..., 2010). In the strategy, biodiversity monitoring is divided into eight categories, as follows: 1) day butterflies in the agriculture and farming environment, 2) national moth monitoring, 3) entrant insects (field insect monitoring), 4) the nature types (biotopes) of the Habitats Directive, 5) proliferating species (*Phalacrocorax carbo sinensis* and *Branta leucopsis*), 6) endangered species, 7) species under the Birds Directive, 8) and species covered by the Habitats Directive.

Unlike in earlier times, the operative monitoring scheme for 2009–2012, combined the national and regional monitoring into one monitoring programme. Also, all of the monitoring projects were arranged to compose larger blocks. This was due to governmental efficiency requirements and a productivity programme that argues for prioritising resource use and concentrating on the most important targets in all sectors of government. One of the main requirements of the productivity programme is to cut down redundant administrative work. Because increasing monitoring needs from the EU and growing needs for financial cuts passed down by the productivity programme exist in parallel, it was stated that creation of the monitoring strategy was challenging and it didn't succeed in covering all of the EU's monitoring requirements (Finnish Environment..., 2009b, 2009c).

With regard to the monitoring responsibilities and demands from the EU, the responsibilities for special monitoring of biodiversity in accordance with Article 17 were still under negotiation in 2011. The main responsibility for reporting to the EU will be ultimately held by the Ministry of the Environment, but the information needed in the reporting cannot be produced without help coming from outside environmental administration (Finnish Environment..., 2008a, p. 125). Preliminary inspection of possible responsibilities and roles in gathering information for Favourable Conservation Status reporting was performed in 2008 by the Finnish Environment Institute (ibid., pp. 125–129). The inspection predicted roles for the following parties:

- Administration of the Ministry of the Environment: the Finnish Environment Institute – regional ELY Centres, the Finnish Forest and Park Service, and Natural Heritage Services (of the Finnish Forest and Park Service)
- Administration of the Ministry of Agriculture and Forestry: the Finnish Forest Research Institute, Forestry Development Centre Tapio, regional forestry centres, and the Finnish Game and Fisheries Research Institute
- Other administrative branches and institutions: the Geological Survey of Finland, Finnish Institute of Marine Research, Museum of Natural History of the University of Helsinki (also regional museums of natural history and biology), and Botanical Museum
- The Government of Åland
- NGOs and enthusiasts (e.g., BirdLife Finland, WWF Finland, and the Finnish Lepidopterists' Society)

Figure 14. The first page of Järviwiki, an interactive, participatory monitoring service combining the knowledge of citizens and environmental administration. The maps present temperature and the algae status of the lakes, and the third picture is a link to a competition in which citizens can present and vote for 'the lake of their province'.

In recent years, national environmental authorities have made some innovative efforts in order to encourage lay people to monitor their living environment and report on it to the authorities. One key forum for such action has been Järviwiki. With Järviwiki, citizens are encouraged to report their ecological, social, cultural, or eco-historical knowledge related to lakes. Also presented are datasets from the environmental administration (such as those indicating the algae status of the lakes) (see http://www.jarviwiki.fi/wiki/Etusivu, in Finnish). These Web pages are the produced by Finnish Environment Institute. Figure 14 presents this wiki's front page.

More details about monitoring and the associated commitments are presented in Appendix 6.

3.8 From top-down administrative culture to recruitment of land-owners

In the last few decades, the greatest influence on the regulatory environment of Finnish nature conservation policy can be traced to the implementation of the EU Natura 2000 network, based on the Bird Protection Directive (1979) and the Habitats Directive (1992). Following the requirements of the Habitats Directive, Finnish environmental administration presented a national proposal for the Natura 2000 network of conservation areas in 1997 in a top-down manner, typical of the administrative culture existing at that time. The debate following the introduction of the Natura 2000 network was exceptional: numerous conflicts arose at both national and local levels. Land-owners questioned the aim of the network, the sites selected for the network, and the ways in which the administration presented both the network as a whole and the selection of particular sites. Some conflicts took rather extreme forms. In the municipality of Karvia, in south-west Finland's Satakunta region, four land-owners began a hunger strike in protest, and land-owners sent, in total, 15,000 letters of complaint to environmental authorities, from all over the country (Hildén et al., 1998; Hiedanpää, 2002; Malmsten, 2004). Thus implementation of Natura 2000 created new challenges both for land-owners and for environmental officials. Although Natura 2000 has since become an integral part of environmental administration and, for instance, the Natura 2000 impact assessments have improved in quality (Söderman, 2009), the criticism levelled at the Natura network's implementation upset the legitimacy of the design of national nature conservation policy.

After – and at least partly in response to – the implementation problems of Natura 2000, the Forest biodiversity programme for Southern Finland (Finnish Government, 2002) was established. METSO has importantly influenced the aims and practices of Finnish forest biodiversity conservation and thus also the regulatory environment of Finnish nature conservation. The aim of METSO is to halt the ongoing decline in forest species and habitats and establish favourable trends in forest biodiversity by 2016, to improve the network of protected areas, to improve the forestry methods used in commercially managed forests, and to encourage forest-owners' voluntary participation in conservation.

After a lengthy preparation process that involved various stakeholders representing forestry, nature conservation, and other societal interests, the Government issued a Decision-in-Principle on the METSO programme in 2002. The programme, covering both state-owned and privately owned lands, was first tested in 2003–2007 and followed by a second biodiversity programme, for 2008–2016 (Finnish Government, 2008). The METSO programme shifted the focus of national forest conservation policy from the state-owned lands in northern Finland to the lands in the southern part of the country, where conservation areas were very scarce and in which private forest-owners owned a remarkable proportion (72%) of the forests.

In addition, METSO was launched in a social climate in which the above-described exceptionally strong Natura 2000 conflict had to be resolved. Resolving the conflict was essential for achieving co-operation with private forest-owners and forestry actors: a rather publicity-savvy group of nearly half a million individuals. To this end, the METSO programme was planned, launched, and implemented especially carefully and with a significant amount of resource allocation to publicising, and also evaluation. In addition to being a targeted resolution of forest conservation conflicts, the METSO programme can be seen as an example of a large-scale global trend in environmental policy at the national level in Finland – namely, the emergence of governance highlighting deliberative or participatory processes of planning and decision-making (Pierre & Peters, 2000; Hajer & Wagenaar, 2003; Innes & Booher, 2003).

Pilot-METSO (2002–2008) was co-ordinated by environmental and forestry administration actors (the Ministry of the Environment and Ministry of Agriculture and Forestry) and implemented by the Regional Environmental Centres (now Centres for Economic Development, Transport and the Environment) and Regional Forestry Centres. From the scales and biodiversity governance perspective, it is worth emphasising that a far-reaching national preparatory process involving various stakeholders representing forestry, nature conservation, and other societal interests took place before the pilot phase of METSO. Especially in development of 'nature values trade', one specific policy instrument for pilot-METSO, rural actors found resolutions to the conflict between forestry and nature conservation by defining nature conservation as fixed-term, voluntary, and financial contracts between forest-owners and government (Paloniemi & Varho, 2009).

In its current term, METSO (2008–2016) is co-ordinated by environmental and forestry administration actors (with the Ministry of the Environment and the Ministry of Agriculture and Forestry) and implemented by the Centres for Economic Development, Transport and the Environment and by the Regional Forestry Centres. Similarly to that in pilot-METSO, a national preparatory process involving various stakeholders representing forestry, nature conservation, and other societal interests took place before the current phase. Substantial detail for the process was gained via thorough evaluation of experiences and impacts of pilot-METSO.

The METSO programme represents a departure from central governing of nature conservation, toward an emphasis on voluntary conservation contracts between the forest-owners and authorities. The aim is to avoid conflicts between land-owners and nature conservation authorities and to advance the appreciation and conservation of forest characteristics that are valuable for biodiversity. Accordingly, METSO has increased the intensive co-operation between various local and regional forest policy actors. Seven regional collaboration networks have connected various people with a background in forestry, nature conservation, and other societal interests, and hundreds of forest-owners collaborate with regional environmental authorities, regional forestry authorities, and local forestry officials (Borg & Paloniemi, 2011a, 2011b).

The METSO programme pilot launched various new policy instruments for both public and private land. On public lands, conservation efforts were broadened towards more intensive conservation work through establishment of new conservation areas and by taking care of and restoring forest sites. On private lands, the innovative instruments tested were tendering competition (in which environmental authorities asked land-owners to offer new sites for conservation, after which they assess which sites are most valuable for purchase for official conservation), co-operative networks (in which forest-owners are encourage to produce social networks through which they may create new conservation ideas), and nature values trade (in which land-owners offer sites to forestry authorities in order to make a temporary conservation contract). Next we discuss nature values trade in more detail, because this proved to be the most innovative method in terms of increasing acceptance and will for official conservation among land-owners.

Nature values trade represents how an innovation made at the local level is present at different administrative levels and how it encourages cross-level communication and co-ordination between local, national, and EU level. Nature values trade was modified and continued in the current METSO programme, with intensive *information sharing* between forestry and environmental authorities and education campaigns for forest-owners. However, now the fee is compensation for the costs of nature management on the site and for loss of income from timber production *instead of an estimate of the nature values* of the site.

The changes that took place in METSO reflect a clear departure from the previous, command-and-control type of nature protection, wherein the initiative and control of conservation was in the hands of the environmental authorities. Even though environmental and forestry officials organise and manage nature conservation in the METSO programme, they do not actually decide which sites are to be conserved on private lands, as the initiative and the right to reject the conservation contracts are in the hands of the land-owners. The old command-and-control system of conservation programmes and the new *voluntary-basis conservation contract* system have many similarities in their practical implementation. Similarly to the old system, the new, voluntary system includes scientifically defined criteria that the authorities eventually interpret. Accordingly, the implementation of both systems has required ecological skills and negotiation skills on the part of the authorities. But the basic philosophy behind the two approaches is dramatically different. While the old system was based on centrally co-ordinated ecological prioritisation, the new one combines ecological priorities with land-owner priorities. On one hand, it allows more flexibility. At the same time it is more unpredictable and, so, riskier from an ecological effectiveness viewpoint. Current discussion considers whether this risk is worth taking in order to improve the legitimacy of nature conservation. Representatives of forest-owners and administration in particular have underscored the importance of voluntariness over the risks of decreased ecological effectiveness.

Moreover, the policy instruments of METSO are indicative of changes in the roles of *non-state actors* as definers of nature conservation policy. As described at the beginning of this section of the report, various stakeholders representing forestry, nature conservation, and other societal interests were involved in the planning of the METSO programme, in what has been quite common practice in Scandinavian countries for decades. In addition, for exploring new kinds of public–private partnerships, the emergence of nature values trade is perhaps even more interesting, because the definition of the nature values trade instrument took place from the bottom up, without any governmental guidance or initiative: In south-west Finland, local actors with a background in both nature conservation and forestry defined nature values trade to serve as their environmental policy solution. Through innovativeness and independent initiatives, they managed to mesh internationally set biodiversity conservation policy goals and regional cultural circumstances. In addition, they were able to overcome the local Natura 2000 conflict and, thus, increase the perceived legitimacy of nature conservation among various stakeholders, especially land-owners. (Paloniemi & Varho, 2009).

Generally, citizens have received various roles in governing biodiversity conservation. Table 8 summarises the modes of such participation. As can be seen from the table, the participation opportunities for citizens differ.

While the first and second column in Table 8 show that some of the processes in which administration activates citizen to take part in conservation efforts might create roles for citizens as opinion- and information-providers only, the third column shows that also people-centred participation arrangements have been seen. However, in Finland, opportunities to participate in determining the conservation work that should be done have been traditionally much better for citizens belonging to NGOs, recognised by administration as relevant stakeholders. Recently, options for citizens' participation in Finland have been supported by e-democracy applications, wherein citizens have had open chances to comment to the Ministry of the Environment on, for example, their hopes for the future directions of nature conservation policies and emerging conservation needs. Also various e-democracy applications are being launched in municipalities to let the people of the municipality comment on the direction of municipal development. Although e-democracy applications seem to provide new and interesting possibilities for synthesising different views and ideas on nature conservation work, it is still too early to say how much opinions delivered via the Internet can and do contribute to official decisions. The strength of people-centred participation in METSO's pilot phase has perhaps also lain in the chance to discuss things face to face and in the funding for the options preferred by citizens, while the strength of the e-era may be the ability to collect a large amount of information easily in a short time. However, the information gath-

Table 8: Citizen participation classified on the basis of the various roles citizens may receive in conservation procedures

Top-down involvement based on administrative initiatives (planner-centred participation)	Inviting citizens to express their opinions (planner-centred participation)	Active citizen participation with power and resources (people-centred participation)
Educating citizens as part of conservation programmes – the target areas for conservation programmes and where the information relevant for conservation is collected are chosen administratively and by groups of experts	Target areas of conservation programmes and collection of information chosen administratively and by expert groups (ecological or local information to support administrative decision-making) – elective participation and participation of NGOs in setting objectives for conservation programmes	Valuable areas chosen through citizens' will and collective efforts (ecological and local information to enact local conservation choices) – encouraging forest and nature conservation NGOs to find new conservation practices in the pilot phase of METSO, and funding this

ered through e-application should also be assessed, before it can be used in administrative decision-making and as a foundation for developments based on citizen ideas; therefore, the resources for this are needed if results are to be achieved through e-democracy options.

3.9 EU State Aid law affecting national payments for conservation

The new nature conservation funds of the METSO programme are mainly channelled to private forest-owners, forest companies, municipalities, and congregations. In the pilot phase, a considerable proportion of the funds of the METSO programme were channelled to private forest-owners through the nature values trade instrument. With that instrument, the government paid land-owners who produced nature conservation services a sum that consisted of both the value of the site for nature conservation and the loss of timber value that nature conservation action taken on the site caused.

Nature values trade received attention in the media and was also applauded by private forest-owners (ibid.). In nature values trade, forest-owners had an opportunity to take the initiative in conservation and make 10-year conservation contracts with the government. The sites to be conserved were selected on the basis of biological conservation criteria specially designed for the METSO programme pilot (Conservation biological…, 2003). The primary criteria for each habitat type, such as the presence of broad-leafed species in hardwood forests or the occurrence of typical grassland plant species in wooded pastures, were used to identify habitats and evaluate their representativeness. Habitats were then evaluated further, via secondary criteria for landscape ecological location and area, as well as complementary criteria for additional values such as the presence of threatened species (see Appendix 5 for further details).

A so-called environmental subsidy continues the piloted trading of nature values in the current METSO programme. The nature values trade procedure still begins on the forest-owner's initiative, followed by authorities' evaluation of the site on the basis of ecological criteria defined for the second phase of the METSO programme. However, the fee now is compensation for the costs of nature management on the site and for the loss of income from timber production instead of a monetary estimate of the nature values of the site. This approach of compensation for lost income instead of payment for environmental services has been chosen because the EU State Aid law, which is part of EU competition law, does not allow such payments. However, the amounts of compensation have remained at about the same rather high level in practice; the question is rather more about how land-owners are informed about conservation and how conservation is presented in public – is conservation relevant as such, or is it an alternative after a preferable forestry option? Another change with the new METSO programme is that now nature values trade agreements can be either permanent or for a fixed time period (Finnish Government, 2008).

Through the METSO programme over the last decade, the basis for nature conservation *funding allocations in the private sector* has been reformed. First, in the pilot phase of the METSO programme, nature values trading was allocated an annual budget of €400,000 in funding throughout 2003–2007, totalling two million euros (Finnish Government, 2002; see also materials from the Finnish Ministry of the Environment and Ministry of Agriculture and Forestry). Other funding for nature conservation on privately owned lands within the pilot phase of the METSO programme included one million euros for competitive tendering in 2004 and 2005 (Ministry of the Environment) and two million euros for co-operative networks in 2004–2006, which funds were not directly allocated to land-owners (Ministry of the Envi-

ronment and Ministry of Agriculture and Forestry) (Finnish Government, 2002). The total sum of METSO funding increased from €0.2 million in 2003 to €8.5 million in 2008 (see Figure 2).

Moreover, when the METSO programme was launched, the funding for the private sector increased hugely, with a proposed budget of €266.5–326.5 million for 2008–2016. A large proportion of this funding is channelled through the Ministry of Agriculture and Forestry and therefore extends and strengthens the role of these bodies in forest biodiversity conservation. This funding has enabled a most extensive project of nature conservation contracts (with a proposal of up to €120–180 million for 2008–2016). This shift is consistent with the expectations of the land-owners, who are used to co-operating with forestry administration when managing and harvesting their forests and willingly make use of forestry professionals' professional advice, while negotiating with the environmental administration is considered less convenient (Paloniemi, 2008). Thus the change in the administrative authorities responsible is indicative of the changes in the power structure of Finnish forest policy – mainly the move from the biological conservation approach of the environmental administration toward the forestry administration's integration of conservation into forestry.

On the other hand, the METSO programme's implementation and funding also indicate intensified *co-operation between the two administrative sectors*. The Ministry of the Environment and the Ministry of Agriculture and Forestry are jointly responsible for two projects: for the planning and implementation of conservation co-operation networks (three million euros in 2008–2016) and for organisation of the co-operation between administrative sectors within the nature values trade framework (€13.5 million in 2008–2016). Also, the regional authorities have established collaborative networks to co-ordinate METSO programme implementation at the regional level.

All in all, the METSO funding for the private sector reflects a change in governance styles towards a *market-oriented environmental policy* (Jordan et al*.,* 2003), part of an international trend of market-based practices and deregulation of environmental policy that has been followed by Finland and other countries (e.g., Sairinen, 2000). The rhetoric and practices of METSO have clearly reflected this discourse. The perspectives of producing nature values, trading them or hiring them out, and trading them voluntarily are elements that demonstrate the changes in language and emphasis.

When one utilises market-based instruments, the value of biodiversity can be relevant. However, there are not many calculations of the monetary value of Finnish biodiversity. The numbers cited by Matero and Saastamoinen (2007, p. 104) for 'disutility from the 'stock' of threatened species' represents existence or non-use value only and is given as 463 million euros for the 650 threatened species. Matero and Saastamoinen include all other values, such as the species' inputs in the production of timber and non-market goods, in the value of these provisioning services, but the value of threatened species is not specified. A key challenge in estimation of the economic costs and benefits of conservation of forest biodiversity is how to estimate the marginal effect of the change in the amount of dead wood on the number of threatened species. The Matero and Saastamoinen (ibid.) study does recognise this problem. In addition, it is difficult to estimate the contribution of any given site for the endangerment status of a given species. Macro-economic calculations cannot easily be reduced to the level of a particular forest stand. It is clear that economic incentives and market-based instruments can be developed also without monetary valuation of the conservation target (Spash & Vatn, 2006). Finally, whether the economic value of a species can ever be expressed in monetary terms, and whether it even should be, is debatable.

4. The current regulatory regime

In this section, we explore current biodiversity policy in Finland by presenting the policies and instruments found in the present regulatory regime. First, we present the variety of the policies and instruments where management of protected areas is concerned; second, we explore integrated conservation; and, finally, we briefly discuss monitoring.

4.1 Management of protected areas

There are various types of protected areas in Finland, based on the *nature conservation programmes* presented in the Nature Conservation Act (1996). These programmes aim to protect certain ecosystems. The national nature conservation programmes are for national parks and strict nature reserves, mires, bird wetlands, eskers, herb-rich woodlands, shores, and old-growth forests. The national nature conservation programmes have been designed by co-operative committees and implemented in a top-down mode. Civil participation was not encouraged during the definition of the programmes (for more about these programmes, see Yli-Laurila, 2000). Conflicts have been seen, especially in the implementation of the programme for old-growth forests and shore areas. Within the national nature conservation programmes, land-owners and environmental officials have mainly negotiated permanent conservation agreements and the practice has been 'setting sites aside', not taking care of the sites in a conservation-oriented manner. This has been problematic in some cases; for example, spruces often become dominant in grass–herb forests with decreasing impacts of other species.

The implementation of nature conservation programmes is co-ordinated by the Ministry of the Environment, and the programmes are implemented regionally at the relevant Centre for Economic Development, Transport and the Environment (previously handled by a Regional Environment Centre). A state enterprise, the Forest and Park Service is responsible for planning and governing the management of conservation areas, while, in accordance with the Nature Conservation Act, a management plan has to be defined for all *national parks* (see Figure 6).

In addition to national parks, there are so-called *outdoor areas* and *wilderness areas*, for which the Forest and Park Service defines a management plan when one is seen as necessary. All told, there are nine outdoor areas, throughout the country, and are 12 wilderness areas, 15,000 km² in all, located in the northern part of the country and therefore also on the lands of the Sami people, the indigenous minority living in Finland. All management plans are defined in a participatory manner. In a management plan, it is possible to specify more detailed rules as to what behaviour is allowed in the area in question (Finnish Forest and Park Service, 2010).

The Centres for Economic Development, Transport and the Environment are responsible for co-ordination of protected areas, and the State Forest and Park Service is responsible for management of state protected areas. To encourage and co-ordinate management of conservation areas, the State Forest and Park Service established *certain principles for management of nature conservation areas* in 1992 and renewed them in 2010 (Finnish Forest and Park Service, 2002).

Even though the greatest conservation efforts in Finland in the 20th century were made in the northern part of the country and on state-owned lands, today's most visible conservation efforts centre on the southern part of the country, as part of the national forest biodiversity conservation programme.

Three elements are essential to the METSO programme and also demonstrative of an emerging voluntary biodiversity conservation policy regime:

1) Increase in cross-sector co-operation: both environmental and forestry authorities enforce policy, with the expertise of regional environmental officials responding to environmental issues and that of forestry officials responding to forestry issues (co-operation between the two administrative sectors has increased, bringing together these two types of knowledge of forest biodiversity conservation)
2) Integration of biodiversity elements into other societal sectors than the environment arena only: the focus of biodiversity conservation has expanded from environmental administration to cover also forestry authorities, and forest-owners are more familiar with the forestry authorities and have started to collaborate with them more intensively than with environmental authorities (Paloniemi & Varho, 2009; Paloniemi et al., 2010)
3) Dialogue of cross-level decision-making cultures: because of the EU State Aid law, the METSO programme has stopped paying for ecosystem service (a local innovation) and started to compensate for lost income (to avoid disturbance to the markets).

Apart from the METSO programme, there have been few efforts to expand conservation areas and their management. One innovation, termed 'the Best Act to Promote Biodiversity in Finland in 2010' by the International Union for Conservation of Nature (IUCN), has involved a private foundation – the Finnish Natural Heritage Foundation (*Luonnonperintösäätiö*) – that addresses private–private action. We explain this next.

The environmental payments system has been encouraged by the Finnish Natural Heritage Foundation, which was established in 1995. This foundation is a small-scale non-governmental organisation promoting protection of old-growth forests in the southern and middle parts of the country. A board of 12 permanent members and three deputy members governs the Finnish Natural Heritage Foundation. The foundation purchases old pristine forests with donated funds and applies them for *permanent protection* on the basis of the Nature Conservation Act. When searching for appropriate sites, the foundation focuses on old uncut forests displaying a great degree of biodiversity. These aims differ markedly from those of the METSO programme, in which the conservation is mostly temporary and also the forest sites that are selected for conservation need not be of superior quality. The trees in protected forests represent numerous species and different life stages, from saplings to full-grown trees and decaying ones. To find suitable sites, the Finnish Natural Heritage Foundation collaborates with public authorities, represented by the regional environmental centres. In 2011, the foundation owned 30 protected forest sites. All of these consist of dense forests, with the exception of a few swamp and meadow areas that were obtained in other connections (Luonnonperintösäätiö, 2011). Also, other small organisations collect money for purchasing protected areas. Examples include the Finnish Dragonfly Society and the Finnish Nature Photographers' Association.

Table 9: Biodiversity governance in Finland

Key legislation for biodiversity conservation	2006's National Strategy and Action Plan for Conservation and Sustainable Use of Biodiversity (2006–2016) gives general guidance in supporting biodiversity and combining various perspectives. The Nature Conservation Act (1996) has aspects directly connected to conservation of biodiversity; more specific acts such as the Act on Wilderness Areas (1991), Forest Act (1996), and Land Use and Building Act (1999) are also relevant in terms of connectivity issues and integration of biodiversity conservation into other sectors.
Key actors involved in site selection and design	The Ministry of the Environment, regional environmental authorities, and the Forest and Park Service
Key actors involved in sites' management	The Forest and Park Service
Multi-level structures	State central environmental administration functions at the national and regional level (as do other state authorities). Municipal environmental administration based on local government is arranged at the municipal level. Multi-level (and multi-sector) co-operation networks act in the METSO programme and in many current projects developing conservation practices. In addition, some steering committees and advisory boards of numerous institutions encourage multi-level co-operation.
Governance levels involved in policy's design and implementation	National and regional environmental authorities are involved in the conservation policies' design. Numerous actors, from various institutions, take part in processes' design and thus in construction of multi-level and multi-sector co-operation structures. Regional authorities (mostly in the environmental sector but also in other sectors as their mandate dictates) are responsible for implementation of policies. Municipal authorities have a very limited role in implementation, although there are possibilities through planning and land-use choices.
Characteristics of the governance	For the most part, C&C and multi-level mechanisms are used. On the other hand, some of the current co-operation processes supported by a specific project may have potential to encourage adaptiveness, but their success is still unclear.

In order to provide a general picture of biodiversity governance in Finland, we give a summary of our conclusions in Table 9. Some of the issues presented in the table are addressed above, while others will be discussed below.

4.2 Integrative conservation

In this section of the report, we explore policies and instruments supporting conservation of biodiversity 'outside' existing conservation areas, by improving regional connectivity and conservation in the wider landscape managed in terms of agriculture and forestry.

4.2.1 Toward more holistic discourses of biodiversity conservation

In Finland, the biodiversity strategy and the Nature Conservation Act are the main road maps in defining how to govern biodiversity conservation.

The biodiversity strategy is a national strategy and action plan for conservation and sustainable use of biodiversity. The programme for 2006–2016 was launched in 2006, with fairly ambitious targets. The strategy aims 1) 'to halt the decline in biodiversity in Finland by 2010';

2) to establish favourable trends in the state of the natural environment in Finland over the period 2010–2016; 3) 'to prepare by 2016 for global environmental changes that may threaten the natural environment in Finland, particularly climate change'; and 4) 'to strengthen Finland's role in the preservation of biodiversity globally through international co-operation'.

Numerous actors, in many branches of government, take part in both co-ordinating and implementing the strategy. A working group with 31 participants, representing various sectors of government and other societal actors, is responsible for co-ordinating the strategy (Finnish Ministry of the Environment, 2007b). The actors collecting and disseminating biodiversity knowledge nationally are the Finnish Environment Institute, regional environmental authorities, the Forest and Park Service and the Forest Research Institute (Metla), private-forestry-focused forestry centres and Tapio, research institutes focusing on agriculture and on game and fisheries, and the Finnish Museum of Natural History. The ministries responsible for the environment, foreign affairs, agriculture and forestry, and employment and the economy have joint responsibility for implementing measures related to international biodiversity issues (Heikkinen, 2007, p. 35).

The discourses presented in the strategy reflect shifts toward approaching biodiversity in more holistic terms. The section on the challenges for biodiversity conservation describes various habitats (forests, mires, agricultural landscapes, wetlands, inland water, seas, offshore areas, mountain areas, rocks and soil, and other habitats (such as urban green areas) that are important for biodiversity), species (including exotic species), and genes (ibid., pp. 24–28). In addition, the section on aims and instruments describes work 1) to improve the network of conservation areas and to make species' conservation more effective, 2) to improve biodiversity conservation as a part of planning and management in various governmental sectors, 3) to produce and disseminate knowledge based on research in order to make biodiversity policy cost-effective and adaptive, 4) to ensure a wide co-operation network among the ministries participating in biodiversity conservation and of other actors, and 5) to improve biodiversity conservation globally through international co-operation (ibid., 28–35).

In view of the evaluation of the previous biodiversity strategy, the Finnish National Action Plan (Hildén et al., 2005) stated that actions aimed at safeguarding biodiversity have not succeeded in stopping the decrease in original biodiversity. Pressures arising from human activities have worsened the prospects for maintaining the full range of biological diversity in Finland: 'Although the exploitation of natural resources has become more sustainable in many respects, and attention has been paid to biodiversity, there are still few businesses and economic activities that would be based on safeguarding or restoring biological diversity' (ibid., abstract).

However, similarly to the efforts of new voluntary forest conservation, it can be argued that the actions associated with the previous biodiversity strategy have had positive societal effects, as stated by Hildén et al. (ibid.). This strategy work, among other societal efforts, has supported public discussion of the need to safeguard biodiversity, and research on biodiversity has increased markedly. In addition, citizens' knowledge of biodiversity has been improved and attitudes toward safeguarding biodiversity have become more positive, which has been especially visible in the change that has taken place in forest biodiversity conservation over the last decade (Paloniemi & Varho, 2009).

The Nature Conservation Act is another major element in nature conservation policy. Enacted in 1996, it aims to '1) maintain biological diversity; 2) conserve nature's beauty and scenic value; 3) promote the sustainable use of natural resources and the natural environ-

ment; 4) promote awareness and general interest in nature; and 5) promote scientific research' (NCA, 1096/1996). Work under the Nature Conservation Act is co-ordinated by the Ministry of the Environment and implemented by the Centres for Economic Development, Transport and the Environment (i.e., by regional environmental authorities). The only role for local environmental authorities working in the municipalities who wish to encourage official conservation is to establish natural monuments of specific conservation value, such as noteworthy trees or stones. Otherwise the responsibility rests at national and regional level. The act is designed to create and maintain a 'favourable conservation status of natural habitats and of wild fauna and flora'. In the case of habitats, this means that the natural range and the areas covered within that range are stable enough to ensure the long-term maintenance of said habitat and of the structure and functions of its ecosystem, and that the conservation status of its typical species is deemed favourable. The conservation status of a species shall be deemed favourable when the species proves capable of maintaining itself on a long-term basis as a viable component of its natural habitat.

4.2.2 The aim of integrating biodiversity issues and participation into other sectors of society

While one point of the national biodiversity strategy is to convince society of the importance of biodiversity conservation and the Nature Conservation Act aims to encourage various stakeholders to take responsibility for specific biodiversity conservation actions, the sector-linked policies are an arena in which efforts are made to integrate conservation work into the processes and practices used in managing and benefiting nature in various modes. As we have focused on forest biodiversity conservation, we present the forest programme as an example of sector-level action plans.

The National Forest Programme 2015 (NFP) was launched in 1999, then improved in 2008 (Finland's National Forest Programme, 2008). The Ministry of Agriculture and Forestry is responsible for co-ordinating the NFP, and the Ministry of Agriculture and Forestry, the Forest Council, and the latter's secretariat and working groups are responsible for its implementation. The Forest Council features representatives from various branches of administration, forest industries, NGOs, and expert organisations. The NFP was prepared in an open process among all stakeholders in forest issues. Several experts were heard in the course of this preparation. Almost 3,000 people participated in citizens' forums. An opportunity to influence the preparation of the NFP via the Internet was provided. The co-operation developed between the Forest Council and its secretariat and working groups, as well as the innovation forum and citizens' forums created during the preparation, continues in the implementation, follow-up, and development of the NFP.

The NFP has been cited as the cornerstone and strategic base of Finnish forest policy. Its aim is to ensure forest-based work and livelihoods, biodiversity and vitality of forests, and opportunities for recreation for all citizens. It promises a lot, with necessary measures described as follows: 'a) Measures proposed in the METSO programme will be implemented […] b) The implementation of old protection programmes will be completed in 2009 for the part of private forests […] c) Biodiversity in commercial forests will be protected during harvesting and management through the use of a broad range of tools in compliance with the National Strategy and Action Plan for the Conservation and Sustainable Use of Biodiversity in Finland 2006–2016, Measure 2 […] d) The impacts on forest biodiversity, water and the nutrient balance of soil of stepping up energy wood harvesting and of harvesting methods

will be studied, and legislation and instructions will be amended as necessary […] e) Management methods that support both the conservation of biodiversity and the aims of forest owners regarding the use of their forests will be incorporated into the advisory services for forest owners […] f) The genetic diversity of forest trees will be protected in accordance with the National Programme on Plant Genetic Resources for Agriculture and Forestry […] g) Finland will participate in the establishment and maintenance of a network for the conservation of forest tree genetic resources in Europe.

One outcome of the NFP is that the METSO programme has been carried through as set down in the relevant government resolution. The National Forest Programme has been one means through which co-operation and changes in some practices at the regional and local level of administration has been encouraged and supported.

Beside forest policy programmes, more concrete guidelines for best practice in management of managed forests have been defined for private forest-owners. An environmental programme for forestry and forest management guidelines for private forest-owners advising forest-owners in how to maintain biodiversity in forests used for forestry purposes were established in 1994. The guidelines state that forestry in Finland is based on the tree species existing in the area normally and normal succession of forest stands. An additional aim is to ensure good timber quality, forest biodiversity, and various ways to use forests. Mostly, however, the guidelines are an effort supporting forestry, while the broad education and advising system aims to ensure that sustainable management practices are applied in forestry (see Metsätalouden ympäristöohjelma…, 1998).

Therefore, critical comment for making mainstream forestry more biodiversity-friendly is needed. There is definitely some progress taking place in terms of rhetoric and new knowledge and skills in protecting biodiversity in the forestry sector, as pointed out by Primmer (2010). However, there is a huge gap between rhetoric and reality. As Tahvonen and his team (Tahvonen et al., 2010) argue, the current forestry practices, which have been proved to cause serious harm to biodiversity, faces serious problems also in economic terms. On the basis of forest growth data from unique field experiments, they developed a non-linear transition matrix or size-structured model for Norway spruce. The objective function includes detailed harvesting cost specifications, and the optimisation problem is solved in its most general dynamic form. In optimal uneven-aged management, the dominant factor in stand density is shown to be limitations in natural regeneration. The authors argue that if the goal is to maximise volume, even-aged management with artificial regeneration (and thinning from above) is superior to uneven-aged management. After the inclusion of regeneration and harvesting costs, the interest rate, and the price differential between sawn timber and pulpwood, uneven-aged management becomes superior to even-aged management. However, such uneven ‘softer forestry’, reflecting better natural changes in taiga forests, has been carefully excluded from the guidelines for better forestry practices.

One specific effort made within the forestry sector in order to safeguard the biodiversity of forests in economic usage has been to exclude biodiversity-relevant forest habitat areas from forestry practices.

Forest Act habitats, described in the Forest Act (FAHs), which the act calls habitats of special importance, are provided for in §10 of the Forest Act of 1996. The aim in conservation of Forest Act habitats is to conserve forest biodiversity and to preserve characteristics

of habitats of particular importance. Protection of Forest Act habitats is co-ordinated by regional Forestry Centres.

Forest Act habitats are defined in the act; special importance for biodiversity in forestry is defined to exist when the following characteristics are present: 1) immediate surroundings of springs, 2) brooks and rivulets, 3) small lakes, 4) grass and herb-rich hardwood-spruce swamps, 5) eutrophic fens located south of Lapland, 6) fertile patches of herb-rich forests, 7) heathland forests on undrained peatland, 8) gorges and ravines, 9) cliffs and underlying forest stands, 10) sandy soils, 11) exposed bedrock and boulder fields, 12) sparsely forested mires, 13) and alluvial forests. Currently, the Ministry of the Environment is funding research into whether the present definitions of habitats and biotopes under protection enable protection of ecological functions (Similä et al., 2010).

A study carried out in the municipality of Lohja, in south-west Finland, has examined the importance of Forest Act habitats for forests' biodiversity (Pykälä, 2007). According to the results, a large proportion of the occurrences of threatened vascular plants, bryophytes, and lichens were found on these sites and they met the criteria for FAHs. However, the coverage and quality of the inventory for FAHs was poor: of the sites on which endangered species existed, only four per cent were described by forestry authorities as FAHs. Therefore, only one per cent of those endangered species dwelling outside the strictly protected areas were designated as FAHs. Moreover, 75% of the FAHs demarcated as such were smaller that they should have been, and the state of biodiversity in those habitats was impaired via logging activities. Even though this is only one study and offers limited possibilities for generalisation, the instrument appears not to be functioning as it is supposed to.

A third element that is limited in biodiversity conservation in the forestry sector is the role of participation in established procedures, other than in cases falling under the METSO programme. Even though the national forest biodiversity programme was drawn up as an outcome of extensive participation and forest policy guidelines reach most mainstream forest-owners, participation and involvement in more biodiversity-friendly practices in the sector are not presented in them. Instead, such elements are deeply embedded in the planning legislation that we describe next.

When the **Land Use and Building Act** was passed, in 1999, it received considerable attention because it highlighted civic participation in a way that was unfamiliar in public affairs in Finland at that time. The Land Use and Building Act was designed to 'to ensure that the use of land and water areas and building activities on them create conditions for a favourable living environment and promote ecologically, economically, socially and culturally sustainable development' (LUBA, 132/1999). It 'also aims to ensure that everyone has the right to participate in the preparation process, and that planning is high quality and interactive, that expertise is comprehensive and that there is open provision of information on matters being processed' (ibid.). Work related to this act is co-ordinated by the Ministry of the Environment and implemented by the Centres for Economic Development, Transport and the Environment (i.e., by regional environmental authorities).

The system of land-use planning is defined in Section 4 of the act. Land use in municipalities is organised and steered via local master plans and local detailed plans. The local master plan indicates the general principles of land use in the municipality. The local detailed plan

states how land areas within the municipality are to be used and built up. Local authorities may prepare a joint master plan with other municipalities if they so desire. Regional land-use plans feature a general plan for land use for the entire region or for a specific sub-area within a region. The Council of State may adopt national objectives pertaining to land use and regional structure. The objective of the act in land-use planning is to promote '1) a safe, healthy, pleasant, socially functional living and working environment which provides for the needs of various population groups, such as children, the elderly and the handicapped; 2) economical community structure and land use; 3) protection of the beauty of the built environment and of cultural values; 4) biological diversity and other natural values; 5) environment protection and prevention of environmental hazards; 6) provident use of natural resources; 7) functionality of communities and good building; 8) economical community building; 9) favourable business conditions; 10) availability of services; 11) an appropriate traffic system and, especially, public transport and non-motorized traffic'. Moreover, the act stresses interactive planning and sufficient assessment of the impacts of plans. 'Plans must be prepared in interaction with such persons and bodies on whose circumstances or benefits the plan may have substantial impact', it states, continuing: 'The authority preparing plans must publicize planning information so that those concerned are able to follow and influence the planning process' (Section 6). A general picture of the governing structure for planning is presented in Table 10.

Other relevant legal acts are described in Appendix 3.

As this section of the report makes clear, many policies and sectors of society have relevance for biodiversity's conservation. Table 11 summarises these policies and the interplay between them.

Table 10: Governing structure of land-use planning

Administrative level	Instrument	Co-ordinator	Implementation entity	Objective
National	The national land-use guidelines	Government	Regional councils and communities	To promote handling of the issues specified, through interactive planning and sufficient assessment of impact, for biological diversity and other natural values
Regional	A regional land-use plan	Regional councils	Regional councils (representing municipalities) and the Ministry of the Environment	To set out a general framework for the more detailed local plans, which are prepared by the municipalities
Local	Local master plan	Municipal councils are responsible, but planning administration usually co-ordinates		To locate various activities of the community such as areas for settlement, services, workplaces, and recreation areas, and provide connections between them – the local master plan guides the drafting of local detailed plans in the area

Table 11: Examples of key policies related to decisions regarding designation and implementation of biodiversity conservation

Key policies –policy instruments affecting biodiversity	**Governance levels involved**[a]	**Conflict- oriented interplay** *(operation with one policy has a direct negative influence on the effectiveness of another)*	**Synergistic interplay** *(possibilities for integration of biodiversity elements/ objectives[1])*	**Potential problems**
Environmental permits	Co-ordination responsibility: environmental administration, with regional environmental authorities responsible for implementation - covers approval of projects within Natura 2000 sites and other protected areas, biotopes, and species governed by national law	Mining energy projects inside PAs	Support for protection within conservation areas of many types and with diverse conservation status ratings (including Natura 2000 areas)	Even though impacts are analysed, various interests (tourism, mining, and intensive building) affect decisions.
Agriculture	Work at national level to co-ordinate the activities: Ministry of Agriculture and Forestry - is implemented at local and regional levels	The negative impact of mechanisation and intensification, greater use of fertilisers and pesticides, intensive use of natural resources, intensified farming (decreased grazing) of meadows and larger fields, and separation of agriculture and forestry (no forest pastures) on the state of biodiversity; limited implementation of organic farming	Agri-environmental schemes Multiple incentives Most farmers' participation in agri-environmental schemes	Basic agricultural schemes seem not to be effective enough for protecting biodiversity.
Forestry	Co-ordination responsibility at national level: Ministry of Agriculture and Forestry, with national and regional forestry centres; local counsellors for forest-owners (NGOs) participate in implementation	Intensified forestry; subsidies for intensive forestry	Long history of forestry inventories The benefits of knowledge of forests in the analysis of forest biodiversity and in selection of sites for the METSO programme	Interests of forestry have been dominating the discussion of forest biodiversity conservation.

1 * indicates regulations **inside** protected areas and ** indicates regulations outside protected areas.

Planning (land-use planning)	Responsibilities at national, regional, and local level: various plans at various levels	Difficulties in including all perspectives in plans (especially those not yet officially decided upon or not supported by sector-linked policies)	Aims of combining diverse values, perspectives, and interests – and facilitating numerous stakeholders' presentation of their interests in planning processes Accounting for existing conservation areas and decisions restricting and focusing land use Possibilities for zoning areas and for recognising ecosystem services and connectivity issues (however, while varied interests may be present, success in this should not be assumed)	Economic interests may have a stronger position in planning processes than cultural and ecological interests have.

4.2.3 The case of the Siberian flying squirrel – efforts for species protection measures

The Siberian flying squirrel (*Pteromys volans*) was added to **Annex IV(a) of the EU's Habitats Directive**, presenting strictly protected species in 1995 in the accession negotiations for Finland. The Siberian flying squirrel is an endangered species that is protected also on the basis of the Nature Conservation Act, and destruction of its nesting and resting places is forbidden. The aim is to minimise harmful effects of forestry on the species, especially by ensuring the existence of old aspens, a relevant key species in the living environment of the flying squirrel. From a scale perspective, the Siberian flying squirrel is extremely interesting. Protection of the Siberian flying squirrel has encountered many obstacles and interesting conflicts, from which learning has been possible.

In the geographical area of Europe, the flying squirrel is found only in Finland and in Estonia. The population of the flying squirrel is dispersed, which has led to many local conflicts, in different parts of Finland, in relation to forestry, construction work, and land-use planning. The role of the actors in the conflicts has varied from one case to the next (Haila et al., 2007, pp. 6–8). Especially when Siberian flying squirrels have been found in suburbs of Finnish cities, protection of the species has delayed and stalled many plans for new residential areas (ibid.). In protection of the flying squirrel, many cultures of operation have met, and protection has produced different protection measures. Nationwide political-administrative steering of the protection has two distinct foci – the protection in land-use planning and the protection measures for forest economy. In land-use planning, one focuses on the squirrel habitats in the many green areas and on developing protection of the squirrel while recreation areas are being developed. In forestry, the protection is done by following strict protection standards with their precise minimal measurements of what is considered a resting or a nesting place and how it should be separated from forestry use (Jokinen et al., 2007, pp. 52–53).

Protection of the Siberian flying squirrel is co-ordinated by the Ministry of the Environment and the Ministry of Agriculture and Forestry. Integration of the protection into forestry is a rather complex endeavour, involving both regional forestry and environmental authorities. The Regional Forestry Centre must inform the forest-owner and regional environmental authorities when notified of plans for cutting a nesting or resting place of a Siberian flying squirrel. A regional environmental authority delimits the site and decides on possible cutting options.

The minimal measurement according to which protection of resting and nesting places is done 'one by one' has been criticised because it doesn't take into account the population vitality viewpoint. If rules are followed and small spots are strictly protected, the population of flying squirrels might still grow weaker. The protection of the population has been seen as needing wider planning perspectives – which entail assessing and protecting the vitality of the population at the regional level and understanding the timelines and dispersal of the natural processes that create suitable habitats for squirrels, with these views incorporated into the planning of the protection.

The protection of the resting and nesting places one by one has also been discussed with reference to the compensation paid to forest-owners. It has been pointed out that the one-by-one 'spot strategy' can lead to very small, not ecologically efficient protected areas because compensation is paid only when the economical protection burden for the land-owner reaches a certain level (Haila et al., 2007, pp. 20–74). There have been questions of the 'partialness', 'fullness', and 'fairness' of the compensation and of the administrative responsibility for the compensation costs. Questions brought up have had to do with whether the forestry and agriculture officials and the environmental officials share the conservation bill and whether environmental subsidies for forest management can be allocated to flying squirrel protection or does the whole protection issue belong to the Ministry of the Environment alone. The Ministry of Agriculture and Forestry and the Ministry of the Environment reached a compromise: if flying squirrel sites coincide with FAHs, described above in more detail, subsidies earmarked for forestry cover flying squirrel conservation compensation (ibid., p. 71).

Compensation areas for flying squirrels have been suggested as one future way to assess the protection problem (Jokinen et al., 2007, pp. 51–57). Also, both scientists and environmental NGOs have portrayed the METSO programme as a possible opportunity to contribute to protection of flying squirrels (Jokinen et al., 2007, p. 83; Luonto-Liitto Ry, 2008), which points in the direction of seizing opportunities for species protection, noticing them, and bringing them into wider conservation dialogue also outside environmental administration. It seems also here that protection programmes should perhaps sometimes be developed so as to be adaptive, so that needs discussed and brought up by social actors interested in conservation can be integrated into the programmes. Some studies have also underscored the importance of collaboration between actors in relation to information and its sharing and synthesis. Not all of the forestry data that might be put to good use for protection of the squirrels is always available. The data collected by the environmental authorities may be shared, but the majority of the information on forests collected by the forestry sector is handled as confidential (pertaining to the value of private land-owners' property) and, accordingly, not to be shared with the authorities of other sectors (Haila et al., 2007, p. 7).

4.2.4 EU funding: Agri-environmental subsidies

The system of **EU agri-environmental subsidies** was established in 1995, with the criteria strengthened in 2000 and 2007. Subsidies are co-ordinated as part of agricultural administration (under the Ministry of Agriculture and Forestry) and implemented by the Centres for Economic Development, Transport and the Environment; regional employment and economic authorities; advisers; and municipal rural officials.

Agri-environmental subsidy schemes were implemented in a top-down mode after Finland joined the EU. Finland's agri-environmental schemes involve two kinds of farm-level con-

tracts: *general* and *special* protection schemes. In Finland, more than 90% of farmers have been enrolled in the general schemes from the start, because of their importance for farm income. Subscription to special protection schemes has not been as successful among farmers (Koikkalainen-Lankoski, 2004; Kaljonen, 2009). The general agri-environmental schemes are aimed more at protection ends linked to water protection, while the special schemes target, for example, supporting organic farming, creating buffer zones, and promoting management of farmland biodiversity and traditional biotopes.

In 2010, special schemes covered a little less than 330,000 ha of areas (Finnish Ministry of Finance, 2011b, p. 271). The evaluation study Significance of the Finnish Agri-environment Support Scheme for Biodiversity and Landscape (MYTVAS) revealed that provision of special-scheme subsidies for the management of traditional agricultural biotopes has been the most important agri-environmental scheme feature where the schemes' effects on Finnish biodiversity are concerned (Finnish Environment Institute, 2009d). However, the MYTVAS study shows that the management of valuable traditional biotopes had not proliferated during the evaluation period, 2000–2006. The study held hope for the next agri-environmental subsidy period (2007–2013), through which new financial options for funding the management of traditional biotopes are now available, as the LEADER-method funding option has opened the special subsidies also to other managers than farmers (e.g., village councils, registered organisations, and associations) (Kuussaari et al., 2008). The area of known traditional biotopes that was hoped would be under management by 2010 was 60,000 ha whereas in 2006 only 25,000 ha of those biotopes were covered by subsidised management. Because the management hopes haven't been fulfilled at the pace desired, the hoped-for larger area of management had decreased from 60,000 to 40,000 hectares by 2012 (a decrease of one third in the area of managed biotopes from that previously hoped for). Funding for management of traditional biotopes has been seen as very scarce outside the aegis of agri-environmental schemes. Land-owners are said to manage almost 2000 ha of traditional landscapes without payment for this work.

The evaluation study of the Finnish Nature Conservation Act concluded that, at present, the work that could take into account biodiversity is poorly noticed in the basic schemes. Although nature-friendly fallows are included in the basic schemes, they are not demanded for every farm. The evaluators also thought that the connectivity target could benefit from biodiversity zones being set up and maintained at the edges of fields, especially on the border between fields and forests (Similä et al., 2010).

In the environmental policy discourse, there are signs of transition consistent with ecological modernisation theory (Jokinen, 2000, p. 137). Schemes aimed at sustainability tend to recognise the following scales: environment (in general), biodiversity, semi-natural habitats and cultural landscapes, and time scales (from the perspective of abilities of agriculture in the future). In practice, environmental support is compensation for the expenses and loss of income that farmers incur through environment and landscape protection measures.

In Finland, agri-environmental schemes have been studied a great deal in terms of ecological impacts, and the results have been discouraging. First, no significant reduction in specific nitrogen load in 1995–2002 was seen (Pyykkönen et al., 2004). Second, even though the subsidised semi-natural habitats were selected well, such selection alone is not enough to ensure species' protection; more active care for the habitats is needed (Schulman et al., 2006), and more areas should be included in the subsidy system (Grönroos et al., 2007),

especially because there was found to exist considerably less valuable meadowland on farms than had been reported (Schulman et al., 2006). Third, in implementation of the subsidies for biodiversity, a noteworthy proportion of sites resembled semi-natural habitats (ibid.); even though the subsidies have improved biodiversity, the actions are probably not effective enough to halt biodiversity loss (Kuussaari et al., 2004).

On the other hand, the impact of the agri-environmental subsidy system on communication between administrative sectors is similar to that of the national METSO programme on the forestry sector. While the expertise of regional agricultural officials (who enforce policy) is backed by a support system, administration, agricultural production, and entrepreneurship, practice has shown that environmental officials have been needed to take care of environmental issues, which has increased co-operation between these two administration sectors, as have the monetary resources of environmental officials. In addition, at local level, advisers and municipal rural officials have had an important role in 'translating' the schemes' language for land-owners, and, thanks to such co-operation skills being applied in practice, they have, for example, made farm-level environmental management plans and translated farmers' experiences back for the administration (Kaljonen, 2009).

In addition, state agencies, such as the Finnish Forest and Park Service and the National Board of Antiquities and Historical Monuments, are significant managers of traditional landscapes. Regional environmental administration bears the responsibility for the management of the traditional landscapes on private land in the Natura 2000 network and for managing those target areas named in the regional management plans that are the most valuable and urgently in need of management.

Many in administration have hopes for creation of a nationwide monitoring system for the traditional biotopes that features opportunities to gather GIS information, easy updates, and free browsing to ensure that traditional areas can be easily considered in land-use projects and planning. However, making this vision reality has been said to need channelling of more resources to management and environmental administration work (Environmental Centre of South-West Finland, 2009).

4.2.5 Green Infrastructure

Green Infrastructure is a strategic tool under development in the European Commission that is aimed at strengthening ecosystems through integrated land management countering fragmentation of the natural environment. Development of Green Infrastructure is an effort to enhance the land's permeability for migrating species and to reconnect habitats that have become separated by intensive land use, transport routes, and urban sprawl (European Commission, 2012).

As the Green Infrastructure approach is still in the development phase, it is not yet explicitly referred to in national policies and instruments in Finland. However, many existing instruments and initiatives support the ideas behind Green Infrastructure. On a national level, in the definition of policy approaches, the most important instruments are the National Biodiversity Strategy and the Nature Conservation Act. In addition, in the creation of spaces to recognise ecosystem services and to create visions to safeguard them through Green Infrastructure, also instruments promoting participation and stakeholder involvement, such as the Land Use and Building Act, become relevant. Moreover, one can conclude from the

expert roundtable that many instruments have a potential role in supporting Green Infrastructure, when used to this end, even though – because they are older than is the rhetoric of Green Infrastructure and ecosystem services – they do not explicitly employ such concepts. Green-Infrastructure-relevant instruments exist mainly for, on one hand, conservation of nature/biodiversity and, on the other hand, protection of some key natural resources (incl. water, and wood for timber). These are instruments that:

- explicitly recognise *the value of both biodiversity and at least one ecosystem service* (some existing instruments do, however, explicitly recognise the importance or value of both biodiversity and a dedicated ecosystem service: the Nature Conservation Act (biodiversity, scenery, sustainable use, knowledge of nature, and nature research) and the Wilderness Act (wilderness-like atmosphere, Sami culture, natural sources of living biodiversity, and ensuring diversified use of nature) along with the Rapid Conservation Act (passed in order to protect river basin areas), which mentions 53 areas where harnessing water power is not allowed);
- recognise *the responsibility to maintain certain natural elements or quality*, usually for the purpose of protecting a natural resource (not an ecosystem service as such), where these include water (quality, quantity, and aquifers), afforestration of forests, etc.; and
- *enable inclusion of Green Infrastructure*: general provisions addressing not protecting the environment, along with stakeholder participation as an important element allowing Green Infrastructure considerations to enter into practice. In particular, the Land Use and Building Act addresses, for example, national and cross-border issues.

There are many elements in forest ecosystems that support Green Infrastructure, among them

- *wilderness area issues:* there are extremely large areas of this type in the northern part of the country, yet there has been conflict between forestry and reindeer herding as well as other societal interests, such as eco-tourism – a context in which Green Infrastructure could perhaps encourage stakeholders to mention and to value various kinds of ecosystem services taking place in such wilderness areas;
- *networks of old-growth forest sites* – for example, in line with discussions of how to mitigate climate change, old-growth forests have been acknowledged as carbon stores, one relevant ecosystem service they offer, yet the old-growth forests are extremely fragmented in spatial terms, and, accordingly, many species of old-growth forests are endangered – for which a general policy instrument, such as Green Infrastructure, could encourage building of a network around existing hotspot old-growth forests found in national parks and nature reserves; and
- *landscape ecological planning*, which aims to widen the scale of planning of state-owned areas to take into consideration regional elements, to combine nature conservation and forestry and thus take into consideration various ecosystems services. Such an approach could be taken as a 'lessons-learned' sort of example in generalisation of Green Infrastructure ideas.

Also, many elements in agricultural ecosystems support Green Infrastructure. These include

- *the situation of semi-natural grasslands*: beside the species of old-growth forests, those of semi-natural grasslands are the most endangered species in Finland, because meadows have decreased to one per cent of their extent at the start of the 20th century, while, at the same time, 90% of farmers are involved in agri-environment schemes, two elements – a need to take greater care of existing and

previously used meadows alongside widespread participation in agri-environmental schemes – that could be combined to produce such ecosystem services as a part of Green Infrastructure, and
- *agri-environmental schemes*, which have further potential even though they reach the most farmers (90% are involved) – more ecosystem services could be safeguarded under this instrument.

In addition, the following elements of land-use planning are promising in terms of encouragement of Green Infrastructure:
- While ecosystem services are a new topic, one that seems to be receiving increasing interest in land-use planning, there are initiatives for restoration of mires, benefiting biodiversity in wastewater management, etc. Such initiatives arise in the context of current planning instruments, which have an aspect worthy of mention here: the current Land Use and Building Act is advanced in terms of participation – it targets involvement of various interests in planning procedures, and, therefore, many ecosystem services can *potentially* be paid attention to. However, a risk is found here: if various ecosystem services or an *aim to notice them* is not explicitly written into the act, they might not be taken seriously enough.
- In planning legislation, civic participation has been highlighted; therefore, there are more possibilities for gathering knowledge and including it in plans. Moreover, such intensive involvement of people has the potential to encompass another scale-relevant aspect, in that participation can foster intrinsic motivation to expand innovation spatially and temporally.

5. Stakeholders' perspective on scale challenges of biodiversity policy in Finland

In this section, we present empirical results gleaned from both focus groups and interviews, in relation to which we explore Finnish scale challenges of biodiversity governance from the angles of *scales*, *site selection*, *connectivity*, and *monitoring*. Scales, site selection, and connectivity issues are explored from the perspective of focus groups, and monitoring is explored on the basis of interviews. We first explore the results of the study and then outline some conclusions in the form of ideas for further steps toward more scale-sensitive biodiversity governance.

5.2 Scale-related issues and challenges

5.2.1 The actors of biodiversity governance and their interplay

In the literature, institutional interplay has been considered one solution that perhaps could effectively address scale challenges (Cash et al., 2006). This can be argued to stem from the observation of how scales are socially constructed and politically defined (Harris & Alatout, 2010). Institutional interplay might thus bring together different ideas and observations of the relevant temporal and spatial aspects that should be taken into account in biodiversity policy as well as create possibilities for negotiations and governance arrangements taking the temporal and spatial aspects noted into account when decisions on biodiversity conservation are being made. However, institutional interplay is a fairly ambivalent solution in itself, in that it can either foster or hinder biodiversity conservation (Paavola et al., 2009). The issues of institutional and policy interplay are strongly linked to the integration of biodiversity policy dimensions into other policies as well as to the co-operation between institutions, actors, and governance frameworks of different types.

The members of the mire protection focus group were asked to present a picture of key actors in mire conservation and discuss the relationships among these actors (see Figure 14). The figure shows that the nature conservation NGO and environmental administration elements, along with other state administration, were presented as having and forming multi-level structures.

In addition, the figure presents numerous roles offered for actors such as organisations and various ways of grouping people. First, stakeholders were grouped as connected to the issues relevant for their biodiversity conservation interests (for example, the willow grouse in the figure) beside official structures and formal roles offered for stakeholders. Second, scientists had a dual role: on one hand, they were presented as part of the mire NGO, while at the same time they were shown in their official role in the Finnish Geological Survey and at universities and other research institutes.

Moreover, the Convention on Biological Diversity was interpreted as an actor in biodiversity policy. It was placed at the top of the paper, reflecting its overarching role. However, it was placed directly above the Ministry of the Environment, not centred above all of the ministries. Furthermore, the figure presents close relationships of certain NGOs to certain ministries. For example, the Finnish Association for Nature Conservation was directly below the Ministry of the Environment, while the Hunters' Central Association was right beneath the Ministry of Agriculture and Forestry. The close relationships of Finnish nature conservation NGOs to environmental administration have been noted in studies of national environmental policy (Sairinen, 2000). Table 12 presents various modes of interplay and policy integration of biodiversity governance.

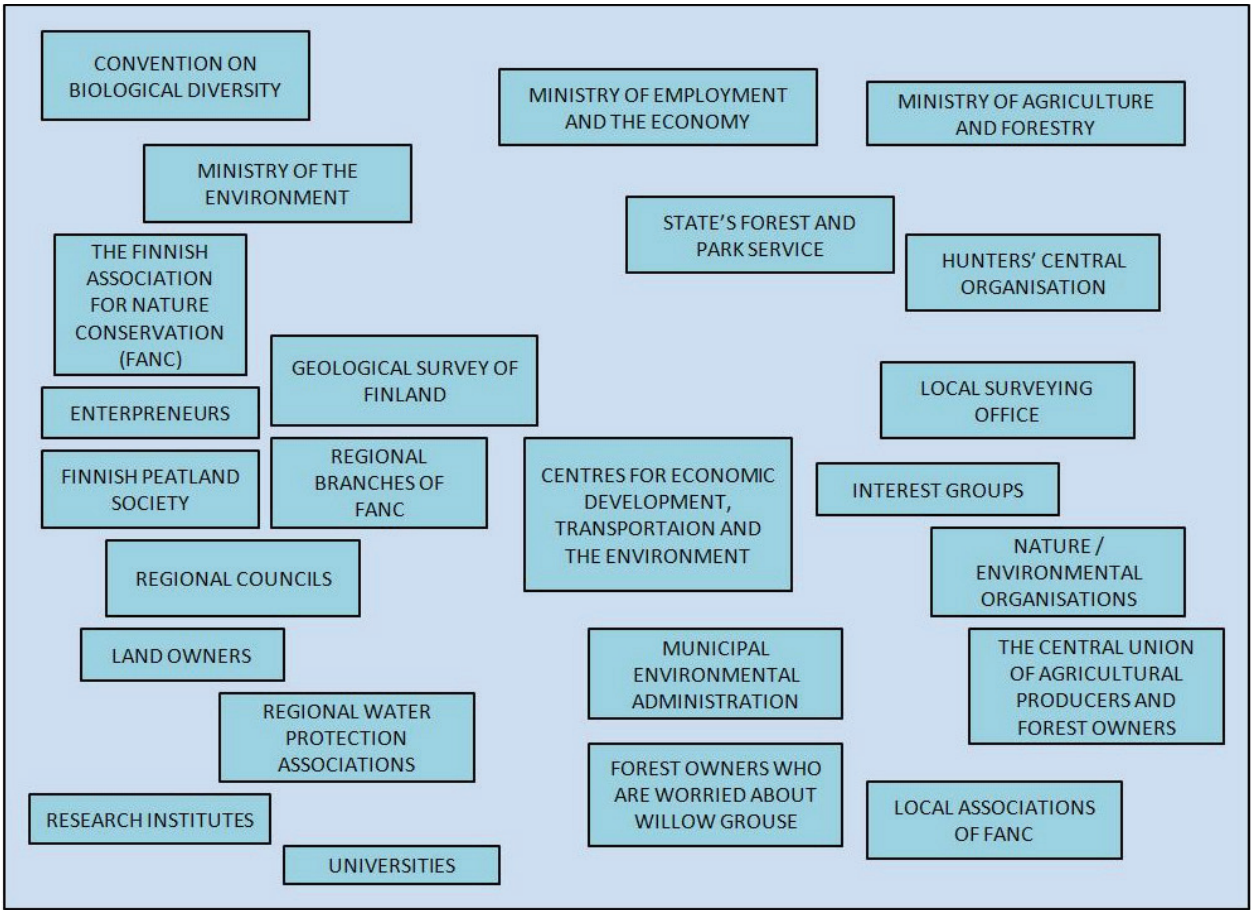

Figure 15. Stakeholders of mire conservation as classified by the participants of focus group focusing on mire protection

Table 12: Vertical and horizontal policy integration, institutional interplay, and the role of institutional interplay in solving scale issues of biodiversity conservation in Finland (inspired by Young, 2002; Kim, 2004; Adger et al., 2005; Cash et al., 2006; Roux et al., 2008)

POLICY INTEGRATION	VERTICAL: vertical levels – local, regional, national, EU	HORIZONTAL: sectors' institutions or actor groups working at the same vertical level (local, regional, national, EU)
Examples of harmonisation	From EU law to national law Work under national biodiversity strategies to set goals for national, regional, and local conservation and the desired harmonisation not always occurring on the ground, because of differences in local development needs, plans, and opportunities (also, constraints such as rules connected to the use of project or incentive money can hinder development of local solutions) The sense that planning in national, regional, and local contexts should integrate national goals into regional and local development	Southern Finland's forest protection programme (i.e., METSO) regional working groups Co-operation of regional agriculture and forest administration and regional environmental administration to address forest protection issues and agricultural biodiversity issues Structural change in regional administration – creating new Centres for Economic Development, Transport and the Environment by combining previously separate organisations

INSTITUTIONAL INTERPLAY: problematic, neutral, or desirable?	*Disruptive separation*, VERTICAL AND HORIZONTAL – many, different processes and institutional developments in progress at the same time, while the planning for structural change of most of the regional administration left out the forest administration
	Mergers: translations of best practice, with environmental protection goals of different sectors influenced by international and domestic developments
	Functionality: Simultaneous development of the new Forest Act and Nature Conservation Act (in the '90s), for their functional coherence
	Negotiated outcome: a negotiated approach guiding much of the institutional interplay, which, while desirable, has at times proved problematic because of conflicts of interest and heterogeneity in terms of the power of some actor groups affecting the negotiated outcome more than others – e.g., for conservation programmes
	Systemic change: needs for systemic change that are derived mainly from developments at the EU level
	Balance: relatively balanced treatment in sectors of central administration and their levels (such as central-regional in environmental administration)
	Synergy: synergetic features in vertical and horizontal interplay in the development phase of METSO
	Conflict: heterogeneity in terms of interests – conservation interest vs. economic interests, heterogeneity of interests of different sectors of administration, and heterogeneity of interests within sectors of administration – as when the forest administration tries to promote both conservation and forestry at the same time The key poles of power in Finland are state administration and local communal administration (both with a regional level: the state's regional administration and communal regional administration, which should negotiate together with respect to regional development needs). The state's interests and local interests might differ. The development og combined state'sregional administration centres directed at the same time decision and planning power from the state's regional administration to communal regional administration.
	Asymmetry: heterogeneity in terms of power – environmental administration has fewer resources than other sectors of state administration, with the Ministry of Finance having a lot of power to influence conservation resources
THE ROLE OF INSTITUTIONAL INTERPLAY IN RELATION TO RESOLUTION OF SCALE ISSUES IN BIODIVERSITY CONSERVATION	Whether institutions recognise mismatches between ecological scales and scales of governance: What is the role of institutional interplay in recognition of mismatches? Interpretation of the terms of scale and scale challenges through each actor's work environment, experiences, and institutional knowledge Whether institutional interplay alleviates ignorance of scales important for biodiversity conservation Answer of 'Yes': METSO's attempts to take the time scales and spatial scales meaningful for forest-owners into account, by letting forest-owners voluntarily inform the administration of their desire to conserve some or all of their forest land if it meets the administration's ecological conservation criteria. Administrative structural change in itself was viewed in the focus groups as not alleviating ignorance of the scales important for biodiversity conservation How institutional interplay enhances the ability of institutions to take into account the plurality issue related to ideas about the scales important for biodiversity governance Conclusion that, if institutional interplay is only information exchange and gathering, the ability to take plural issues and ideas into account takes time – if resources are poured into enhancing institutional interplay and giving time for interaction and doing something based on shared concerns, institutional interplay might enhance institutions' ability to take account of plural issues and ideas, create solutions, and work together for means to ends

5.2.2 The scale issues

Some participants had more theory-rooted experience of discussion of scales than others did. However, through the use of concrete examples (of case areas and practices applied there), the discussions explored various scales. At the beginning of the interviews, the following scales relevant for biodiversity conservation in the context of south-west Finland's issues were cited:

- Spatial scale
    - The size of conservation areas / areas where conservation efforts take place (e.g., global to field)
    - Various hierarchical levels and directions from which to look at the problem: grassroots, national, EU, or global level
    - Biodiversity conservation as a global question and what it means at national, regional, or local level
    - Maps and information systems representing ecological knowledge (what is included and what is excluded)
- Temporal scale
    - Protection of species for longer periods
    - Impacts that emerge later
    - History to the future
    - The government platform: we don't understand 200 years and we don't even think about 1,000 years
    - Time scales of administrative practices (programmes and institutionalised functions)
- Ecological scales
    - Fine to coarse ecological scales (e.g., bacteria — species — habitats — eco*systems*)
    - Connectivity (habitats and routes for small animals: large animals, diversity in the contexts of different parts of Europe, and different land use in the cities – protected areas)
    - Diversity: the variation in differences in species (and other) richness
    - Impacts of climate change on ecological processes and spatial changes
    - Conservation biological *value* of the object (a species/ecosystem) on local, regional, and/or national *level*
    - Hierarchical levels of ecological knowledge (layperson, NGO, amateur, administrator, and specialist, alongside differences in knowledge and its valuation between countries, affecting the scope and the ecological units that can be observed)
    - Priority of ecological factors over other issues or other issues above ecological aspects
    - The importance of the differences between bio-geographical regions and the effects of climate change on bio-geography
    - The importance of thoroughly understanding ecological systems if one is to develop nature conservation
- Scale of practices: passive to active conservation
- Socio-psychological scale
    - Values (what is important to what is not, as in which species are covered, and which not, by national legislation and directives)

    - Political ideologies
    - Interests
- Social and political scales
    - Scales of individuals (how actors perceive issues and how they set borders)
    - What questions are (and are considered) political issues (because they are not taken for granted)
    - Different jurisdictions' possibly various meaning for concepts referring to ecological phenomenon, which might create different scales of observation
- Scales as *processes*
    - Processes as formed to some degree by structures, rules, and forces
    - Scales as interactions between time and space
    - Complexities that conclude together various ecological and social 'scales and levels' within a case and *produce a 'scale'* (e.g., for the Saimaa ringed seal, elements such as the river basin, climate change, fishermen, and the global economy)
- Governance scale
    - Local or municipal level, *dealing* with national-level aims
    - How things/problems are *perceived* at the local level vs. how they are perceived at national government or EU level (centre–periphery conflict)
    - How things are *perceived* from within the administrative structures (biological holistic education vs. administrative work during implementation of policies)
    - *Democracy*: that all governance levels (national to municipal) must work
- Mismatch between ecological and governance scales
    - Borders of nature vs. human borders (administration, ownership, and governance)
- Mismatch between input and output (what is done and what is achieved)
- Mismatch between local, national, and global perceptions (how issues are perceived)
- Mismatch between systems, as in ecological system (forest) vs. social system (forestry)

Because there are so many scales of examination and interpretation, a problem of plurality is common in biodiversity governance (see also Appendices 7–9 describing the aspect of plurality in the focus groups definitions in more detail).

Next, we will describe in detail the mismatch between ecological and governance scales.

The borders of nature differ from the boundaries imposed by people. An illustrative example cited in the focus-group discussions is a river basin, which, especially in southern Finland, often is larger than the area of one municipality. For historical reasons, land ownership is dispersed into small entities. An example given to demonstrate this was an island in south-west Finland that in mediaeval times was owned by one man and now is divided into properties of 40 people. As a result, many habitats are found on the land of several land-owners.

Mismatch between input and output creates a need to compare two aspects: what is done and what is achieved. For evaluation or monitoring of conservation's effects, it is important to pay attention to the fact that achievements may occur well after resources are poured in. This is a challenge for monitoring of development. This aspect shall be taken into special account in analysis of the input and output of site selection procedures. For example, pumping resources into voluntary and temporary conservation might increase the perceived legitimacy of conser-

vation, but on a long time scale it might be more expensive and less effective in ecological terms than a conventional top-down approach to selection of sites (Juutinen et al., 2009).

Those at local, national, and global level have different perceptions about conservation, which derive from their experiences and social positions. However, many actors in the Finnish conservation policy field today act from several positions. For example, a municipal administration official worked as a farmer as a leisure pursuit and, consequently, had direct connections with other farmers and was able to conclude environmental contracts more easily with them. This demonstrates transferability of learning from one context to another.

Mismatches occur also between the ecological and social system. For instance, in silviculture, the resilience and adaptive potential of biodiversity is often forgotten. If forests are cultivated too intensively and in too simple a way so as to increase productivity, ecological processes are disturbed and interrupted. Such actions include prevention of forest fires and an extensive removal of wood and decayed tree material, both of which endanger forest habitats and species.

5.2.3 Scale challenges

Despite the ambiguousness of the concept of scale, the participants in the focus groups were able to identify constitutive scale challenges related to biodiversity protection. The challenges identified were 1) regional and spatial differences, 2) the time-scale issues, and 3) protection 'in between' official conservation areas. Even though there are attempts to bring these topics within the scope of current policy tools, intensive efforts are still needed.

South-west Finland, the area on which two focus groups focused, was compared to other regions of Finland. The spread of habitat types in south-west Finland and the amount of fields were discussed as major regional and spatial differences. A participant from an environmental NGO also compared south-west Finland to other regions and pointed out that 'guidelines concerning best practice in biodiversity protection and promotion might be different than in other parts of Finland' [FA 2]. She separated areas dominated by fields into their own entity, to be treated as such. Possibilities to combine regional assets were considered from the perspective of management of the traditional biotopes. Over the last hundred years, the decline in grazing has made many countryside biotopes rare and threatened. Combining regional assets for their conservation might not be easy, because possible reasons as well as solution to problems may be found outside the region.

> FA 2: *Horses from Helsinki could come to spend their summer holidays in our pastures* [pastures in south-west Finland]. *But getting all of the relevant people together is one really big problem as well.*

Regional and spatial differences and time scales were considered challenges related also to connectivity. Especially in discussion of the network of protected areas, connectivity was seen as a goal to strive for. Building and organising a connected network of protected areas was seen as impossible in Southern Finland because of the concentration of settlement and the land values. Southern Finland was seen as an area where land-use demands will keep growing and so the distribution of rare and threatened species will become concentrated in certain protection areas; and balancing the regional distribution of Southern Finland's threatened species might not be possible. Representative FA 7, from the Ministry of Agriculture and Forestry, saw the regions near the capital city as having a growth-oriented planning

culture, which would not prioritise protection of biodiversity as the main goal of planning and land-use schemes.

In the interviews about biodiversity monitoring, connectivity was mentioned also in the context of regional and spatial differences. Western Europe was seen in the same light as the capital region in Finland: densely populated and with limited possibilities for large-scale connectivity plans. A government agency's representative raised the issue that connectivity is seen differently throughout Europe, depending on each country's possibilities for increasing it.

> MON 1: *If the basis for preparation* [of European guidelines concerning connectivity] *comes from a basis in Holland and Belgium, their connectivity is that you leave a ditch between two city parks as a ditch, a grassy ditch, so that mice and other small animals can run from park to park.* […] *But here we think about a border zone between Russia and Finland, and its string of pearls of national parks, a zone of 1,000 x 50 km, which should be made compatible for large mammals to travel through. It should be made into a route in the North and Scandinavia.* […] *Those scale differences, for instance, in this* […] *sometimes they do not understand us at all. When we say that we do not want to spend as much and make as precise efforts for the ditch projects as the Dutch, they do not understand this. The only way is to bring them here for a conference or meeting and then go walking, and then they are at least sometimes abashed.*

He stated that there are differences in Member States' views and visions of connectivity but countries have no real contradictions in their wishes to increase connectivity, as they share a common goal. The problem of spatial and regional differences and changes in time that affect possibilities for increasing connectivity was seen as an issue that has to do with common EU-based rules and co-ordination more than one of different views and needs. He said that it is important to keep in mind the differences between Member States; otherwise, one would end up with funny rules leading to unnecessary expenses and non-existent benefits.

5.3 Site selection and management

5.3.1 Natura 2000 and a new conservation approach

In the discussion of stakeholders presenting nature conservation administration and practices, Natura was presented as an excellent opportunity to improve biodiversity conservation in the country. It was stated that Natura, with extended funding, has made it possible to increase the conservation area by implementing national nature conservation programmes that had already been launched but had, because of limits in financial resources, not yet been completed.

It was surprising that the Natura programme was presented in such a positive mode, because more often in Finland implementation of Natura has been criticised intensively (Hiedanpää, 2002; Oksanen, 2003). However, in this part of the discussion, the evaluation focused on the 'outcomes' of Natura implementation, not the 'process' of implementation and how it was perceived by the land-owners.

The 'framing of conservation' was another relevant point about Natura, presented by the stakeholder from the national organisation representing land-owners. She argued that when discussing Natura with her European colleagues she had noticed relevant differences in the aspects that have been promoted during the implementation process. In some other countries, social aspects, especially the benefits that the network produces for livelihoods, have been underscored. In these countries, land-owners have perceived the conservation-area

network as supporting them and, accordingly, have accepted the programme in general. She illustrates how differently the same Natura instrument has been implemented in different parts of the EU by continuing:

> FA 3: *In Finland, this has not worked at all. Probably during the Natura implementation process, these issues became a totally forgotten aspect of the aims of the Natura programme.*

One possible explanation for the framing lies in the tradition of nature conservation programmes in Finland. In this tradition, there has always been a very strict dichotomy between protected and non-protected areas. Apart from tourism, usually no economic activities are allowed in protected areas and even the property rights are typically transferred to the state.

As an outcome of this significant forgetting of social aspects within Natura implementation in combination with the recent opposition to Finland's EU membership among rural residents, extreme conflict took place: intense demonstrations and even hunger strikes were seen (Hiedanpää, 2002). This conflict has been described many times, and it has become a rhetorical device for land-owners even in both of our stakeholder focus groups. However, the Natura conflict doesn't seem to be so serious an issue anymore. More discussion centred on how Natura encouraged policy learning.

The culture of governing biodiversity is to be changed, as a civil servant from the Ministry of the Environment put it:

> ENV 7: *The problem presented by* [E 2, describing a need to integrate knowledge into planning processes] *is an issue that we can overcome, because it depends on our culture. It depends on how we develop our decision-making processes, how much time we allocate to co-operation and communication within these processes. We have learnt it from the mistakes, even from many mistakes. Well, it* [culture] *is to be changed through them as well. Should we have some kind of quality system or something like that, which would push us to evaluate which organisations need to be included in the process? VELMU* [the Finnish Inventory Programme for the Underwater Marine Environment] *is an example in which we in Helsinki* [in the Ministry of the Environment] *consciously, strictly involved the actors in mutual co-operation at the regional level. First, there were some wondering such as 'Do we really have to do this?', as they often ask in Turku.*
>
> ENV 3: *We didn't, well, ask that...*
>
> ENV 7: *Really, now?* [laughs] *But when it* [co-operation] *started to work, it got good feedback. Because there were some previous similar experiences, we believed in it. I think that this is something that cannot be taken for granted; we need to change our practices. We have to place the value on co-operation; the 'cold facts' are not the only thing we need.*

In other words, as an outcome of policy learning, co-operation across administrative sectors has become more intensive, and, accordingly, the participants in our focus groups have been involved in various committees and meetings. In view of the fact that discussions in the focus groups worked well in deliberative terms – with participants expressing themselves rather freely but still peacefully even when sharing actually contradictory opinions and, especially, speaking of issues about which they felt unsure – it seems to us that such policy learning processes have increased social capital between nature conservation policy stakeholders.

However, there still are some forgotten actors in the administrative structures. Environmental authorities of municipalities seem to be especially excluded from most biodiversity conservation policy processes. They have a role only in protecting separate natural monuments, and they often have only limited access to the environmental knowledge of other authorities – for example, to regional forestry authorities' databases, which have recently been opened for national and regional environmental authorities and researchers. There is room to continue trust-building between actors.

In addition to administrative co-operation, the communication between land-owners and officials has become more encouraged and appreciated. In particular, voluntary approaches have been stressed in recent decades (Paloniemi, 2008). In the focus-group discussions, the forest biodiversity programme for southern Finland (METSO) and protection of wetlands were named as examples of well-accepted site selection processes. Stakeholders argued that it has been easy to make such contracts and the contents of the contracts have been comfortable for land-owners, and these innovative instruments are voluntary, temporary, and well-paid.

On the other hand, it is important not to simplify and generalise the acceptance of the contracts too much. One stakeholder from a Regional Forestry Centre pointed out that it is vital to remember that:

> FA 5: *In south-west Finland, there is strong support for permanent conservation. There are dozens* [of land-owners] *queuing. It's also wanted. I mean, even though we have only very limited funding,* […] *also this other alternative is asked for. This is how the state can promote permanent conservation, clearly do it for larger sites. That's the situation to which it leads.*

The aspect of time scale explored in the quotation above raises an interesting scale issue in site selection. It seems to be different forest-owners, with different perceptions, who appreciate temporary vs. permanent conservation contracts (Paloniemi & Vainio, 2011). In addition, from the perspective of conservation biology, it is worth exploring the management challenges arising from temporary and permanent conservation. How are the conserved sites managed?

5.3.2 Management of conserved sites

Many conserved sites should be managed in a considered manner, and, in principle, state enterprise Finnish Forest and Park Service Metsähallitus is responsible for managing conservation areas on both private and public lands.

> ENV 1: *How many Action Plans for Management* [APMs] *are made in a year? Not so many.*
> ENV 7: *40*
> ENV 1: *Yes, we have a few more than 1,800 Natura sites. Well, there is no need to make an APM for all of them. Many areas need just to be set aside, but, actually, we have in Finland this know-how concerning APMs. We all have been asked to participate and drink coffee together. In that sense, there is no problem. Finland has even imported the APM system of the Finnish Forest and Park Service to other countries. But the biggest problem seems to be that it's impossible to prepare them with the current* [limited] *funding.*

However, the management of conservation sites is not about merely designing the management; it is also about managing sites in practice, about the resources for doing so. A

land-owner argued that far too little is paid for taking care of his private lands (in comparison to what the Finnish Forest and Park Service pays the companies that do the same things on state-owned land). On the other hand, funding for management is limited as well.

ENV 7: *I think there are many more questions* [besides hunting, which was presented as a potential new issue of conflict related to conservation areas on state-owned land], *because we have Natura sites that should be actively managed and used but that are not managed by the Finnish Forest and Park Service. In addition, these sites cover rather large areas. We have, for example, forest habitats on eskers, complete lines of eskers, forming quite large areas. There the vegetation sets special demands for forestry practices. During the latest round of negotiation for rural aid, we suggested that we could use EU subsidies for these areas in order to modify forestry practices at least on the Natura sites. However, we were informed that in Finland there is a strict dividing line between fields and forests, so...*

ENV 4: *It's the border ditch!* [laughs]

ENV 7: *…so it's impossible. But perhaps during the next round. There are lots of cases in which one could motivate and support local activities and thus get extremely good results.*

The management needs of agricultural and forest habitats differ from each other. Generally, land-owners, who, on average, are growing older, cannot take care of the sites themselves, on account of advancing age. Especially in the case of meadows, animals (such as cows, sheep, and horses) are used to graze the habitats. However, nowadays it's difficult to get them transferred to the areas where habitats need management. Therefore, technological innovations may be needed also, in order to remove biomass from the sites. In the case of forests, stakeholders didn't even mention how private forest-owners could practise conservative management of their privately owned forests (for example, fire management and increasing the amount of decaying wood, which are action that decrease the monetary value of the timber; see also Paloniemi & Varho, 2009). Instead, such actions were considered a responsibility of the Forest and Park Service on the state-owned lands.

To find a solution to the problem of different kinds of demands on conserved sites – some must be set aside, some need conservative management, and others do not suffer in human use – stakeholders discussed the aim in *zoning* of internationally valuable biodiversity areas and fragmented ecological complexes. The idea of zoning comes from land-use planning, the practice of designating permitted uses of land on the basis of mapped zones that separate one set of land uses from another (cf. Geneletti & van Duren, 2008). The idea of zoning was emphasised especially in the case of UNESCO's Man and Biosphere network, of which a national park in south-west Finland was a part, and, accordingly, in which interactions between nature and people were promoted. Generally, zoning was seen as having potential to increase biodiversity-friendly land use in areas between strictly protected hotspots and thereby to increase ecological connectivity.

5.4 Connectivity

5.4.1 The problem of 'in-between' areas

The question of connectivity has become more frequently discussed in Finnish nature conservation policy over the last decade. The issue has entered discussion especially in the context of forest biodiversity's conservation (Lehtomäki et al., 2009). The question of connectivity becomes essential in the context wherein the existing conservation areas are rath-

er tiny when compared to the forest areas in economic use. A stakeholder from a national nature conservation organisation stated that conserved areas are like 'holes made with a fowling piece' in the landscape, and another, from a regional forestry association, referred to the METSO programme as follows:

> FA 4: *Somehow, we just have to accept that the state of affairs is that, in certain places, it's fragmented, like candles in the night. We have managed to protect really good sites, but they are dispersed, but, well* […] *however they are, those candles are there and they are burning, and conservation is progressing.*

It was stated that the question about what happens in those large areas that are not conserved is a fundamental one in terms of protection of biodiversity. The participants voiced a concern that while some sites are conserved, most other areas will probably be exploited more intensively than before and that this should be taken into account in work to govern biodiversity from a more general perspective:

> ENV 3: *What* [participant E 7] *mentioned: here are our old conservation areas* [draws on paper], *and here are the 'areas in between' I have mentioned, and now we add here some small METSO sites. Then, in practice, these areas existing outside METSO conservation will be managed more intensively, which is bad. Well, the fact is that greening and conservation efforts should be integrated into all sectors* [of society], *even though the state aims not to be responsible for paying for it. I think that VELMU may be a step in that direction, because – at least on paper – seven ministries, in total, are involved in it, and in the last few years a certain amount of progress has been achieved in it, and nowadays funding for inventories has been received, and the Ministry of Defence has agreed to let us use their information. Well, this can be a possibility.*

However, some problems occur when authorities implement nature protection. For example:

> ENV 3: *The scales come mostly from the administration, but then we* [the nature protection department of the regional environmental authority], *our education is of that type that it could give opportunities to take into account the whole scale of biodiversity, and then such contradictions usually arise from this that you act against your better education and knowledge, so quite a challenging package.*

In examination of the reasons for such problems within and between jurisdictional scales, values were discussed. Even though the Ministry of the Environment was acknowledged as having supported and encouraged conservation of biodiversity, the leading politicians and civil servants were generally criticised for not having supported it enough.

In addition, within knowledge production practices, other types of knowledge were deemed more important than ecological knowledge. Even though political decisions are often based on ecological knowledge, it was argued that production of ecological knowledge doesn't receive enough funding in critical sectors of new EU-based policies. However, today the problem may not always be the amount of knowledge so much as abilities to interpret it and to compile huge amounts of already gathered knowledge for understandable directions. Even though the Zonation algorithm (cf. Lehtomäki et al., 2009) has been used in allocation of conservation efforts in protection of 10,000 hectares of state-owned land in 2009–2010, such attempts to synthesise knowledge are still few in number, as mentioned by a planner and municipal official with no access to the relevant databases.

5.4.2 Opportunities to solve connectivity problems

Stakeholders mentioned many rather straightforward opportunities to enhance the state of biodiversity outside the conservation areas – i.e., to improve connectivity. The efforts cited were certification of the forests, greening of agriculture, organic farming, strengthening of permit conditions for mires, co-operation between municipalities and regional forestry authorities in the area of nature information, exclusion of perverse incentives, an increase in positive , and higher prioritisation of environmental factors in official purchases (supporting organic farming, for example). Such changes were seen as increasing opportunities to make more biodiversity-friendly choices and, at a deeper level, creating possibility spaces in which it is easier to make such choices.

Even though such opportunities through which biodiversity conservation could be included in other sectors of society seem to be easily implemented, they may encounter problems in practice. Because they challenge current ways of thinking – for example, in asking a land-owner to produce less intensively or other output than in conventional forestry/agriculture (such as scenery values or recreation opportunities). The challenges to current ways of thinking can take complex forms. This is a question not only of discrepancy between lay knowledge and scientific knowledge but also between disciplines, as between ecology and economy. An expert in forest ecology demonstrated this idea:

> EX 7: *Well, often, biodiversity is based on small-scale heterogeneities, I think. It's essential; it emerges generally in the systems, and currently it's contradicting with, for example, economy. You referred to the case of agriculture; it seems to be conflicting with the scale of economic activities, at least the understanding of what is an effective and sustainable way to use natural resources. We have to ask, however, whether the large-scale way is always the most effective one. I'm not an economist, but at least in the forest sector, the clear-cutting economy has been seriously challenged such that it's neither an effective nor an economical way. Indeed, it seems the opposite: this means that a small, heterogeneous system is also economically more effective. It seems that we could find a win/win situation there; we could produce effectively, build a productive forestry system, and simultaneously maintain biodiversity.*

From the scales perspective, this was a very interesting and challenging debate. What are the relevant actors and forces that affect behaviour? Choices are neither based only on rational reasoning nor made at a specific spatial area or level. They are made in dynamic and multi-level circumstances.

> EX 1: *Yes, I think there is a problem* [referring to the argument of EX 6 that in Finnish Lapland one should repeat a deliberative process gone through by Canadian Indians over the span of 25 years, with the outcome of a complex map with various ways to use land]; *again we assume that the essential agency from the perspective of the area exists inside the area, and that we can set it on the map. Often this is not the case. If we think of agriculture in south-west Finland, it is remarkably affected by external forces. The case is not that those standing in the fields are making work for water protection, for example. Agriculture, in general, is in turbulence; there are market forces, there are subsidies, there are different forces exerting an effect. Agency is not limited to the place. This is connected with what* [EX 8] *said, how to get in touch with these multiple levels and with the fact that circumstances of action are constantly*

changing, and in a sense scales are changing. We are back in process. It's difficult to say that this is where you can operate for 20 years, because it's not evident.

Such dynamics and multi-level interactions that emerge during the planning and implementation processes for nature conservation are relevant issues that were explored in all focus groups. The discussions underscored a need to encounter non-hierarchical communication, already briefly discussed above, but also a need to be sensitive to the practices that actually create scales for nature conservation as well as take time to link people who could make conservation easier by combining their resources and knowledge.

Planning was presented as a possible solution for getting biodiversity conservation to work better at the larger scales. This was highlighted especially by the stakeholders with a national nature conservation organisation and the national office of the Forest and Park Service. Actually, in the focus-group discussion in which participants came from the environmental sector, planning was represented as a highly promising way to solve scale-related problems of biodiversity conservation (i.e., scale mismatches between different policies and land uses), more so by the other stakeholders than the one who actually was working as a planner.

The stakeholder from the provincial planning organisation argued strictly that planning has only limited possibilities in protection of biodiversity.

Interviewer: *Do you think that a planning instrument could solve this* [integrate other sectors in biodiversity conservation]?

ENV 2: *There is lots of will for planning, I know. I think this is an essential question; we don't achieve it* [biodiversity conservation] *if we are not able to combine it with other policy sectors. We can achieve some progress when we have enough money, good plans, and law, but nothing else. We cannot include in plans such conservation areas as are not included in sector policies, legitimising the conservation, especially if the site is strictly conserved. Some educational, or – what to call it? – information about conservation values it's impossible to include in the plan* […] *if it's not connected to the policy sectors. I would probably be the best planner in the world if I knew how to do it easily. When I listen to these different opinions, well, of course, it's the task of the planning, the core of planning, but* […] *information sharing is important. We may not agree on everything, we may deeply disagree, but it helps in going on. However, the resources are limited in many organisations. Often there are experts; we would also need those ready to make coffee and facilitate people, an organisation that would have resources for co-operation. We would also need more of it, besides basic work. We should do it.*

Moreover, in another focus group, where participants came from the forestry and agricultural sector, planning was also stated to be a potential means of biodiversity conservation, but the idea was opposed, and more deeply than in the previous quotation. This time, the reason for opposition was the defending of the right of one specific interest group – that of private land-owners:

FA 1: *Yes, well, there are differences between municipalities. For example, already in the '80s, Koskeljärvi, in Eura [an internationally valuable waterfowl lake], was mainly protected through planning. I mean sometimes it can be a good way out.*

Interviewer: *OK.* [FA 3?]

FA 3: *Concerning planning, I have to say that from the perspective of the land-owner, it is an extremely poor way, because it's the question about justice. Here again, there are various scales, depending on plans. But if large areas are to be set on the plan, and there are differences between, and even within, the areas in how strictly map symbols are interpreted, and people don't know what one is allowed to do and what one is not, what licences are needed, as well as what the practices with compensation are. Planning is perhaps the worst way to protect biodiversity, from land-owners' perspective.*

FA: *If I could comment on this... Well, the example I mentioned. First the municipality or the state bought. Of course, we have to include in the process some procedures for changing land ownership and for giving compensation, among other elements.*

FA 5: *Yes. I have benefited from the plans; we have got information from them. For example, from Kankaanpää's Component Master Plan, we saw a forest area governed by the Forest Act but where environmental values were found. There is also this kind of map symbol in the plans. I don't know for sure how much such map symbols restrict forestry, but they are an extra reason to make a contract to receive environmental aid.*

Interviewer: Yes, good point. Well, whose turn? [FA 4.]

FA 4: *Well, actually what* [FA 5] *said before: 'I don't know how much it restricts' is the point. In the context of planning, the interpretation gets a central role if nature conservation emerges under the specific map symbol or not. Of course, first what the legal consequences are depend directly on the target of the plan – is it a provincial area or local village or something else? However, when guys start to implement the plan, how do they interpret the symbols on the map? There is a risk that completely different actions are taken on different sides of the municipal border. Then, if we again think of the land-owners – are they equally treated? – conflicts take place. I would fully agree with* [FA 3]: *it's an extremely difficult way to educate in nature conservation.*

To conclude, the perceptions of planning were contradicting. On one hand, planning was seen as a promise, a good holistic opportunity for integration of various aims and even to educate citizens in taking more conservation actions. On the other hand, to develop planning toward being an integrative instrument, we should first – either beforehand or during the process of defining a plan – get other societal sectors involved in the means promoted by the plan and, then, while implementing and interpreting the plan, make sure that map symbols are interpreted equally enough. This is important especially if plans are used, as suggested by stakeholders, to educate citizens about nature values found within the planned area and to encourage them to make conservation efforts in practice.

Since Natura, site selection in Finland has become generated more by local and regional actors. In the METSO programme, the scale of the river basin is placed at the focus of the examination of connectivity of the protection areas. Regional administration will check beforehand, via GIS-based inspection, which areas should be considered most important for river basins. After this, the administration will propose these areas to the land-owners, who will then either agree with the selection or disagree with it. This development in site selection and connectivity-building suggests new demands as to how ecological knowledge is used and employed. In voluntary-basis protection, interactive means and procedures to generate ecological knowledge from potential targets of protection and from these targets' potential future values in terms of biodiversity are emphasised, as is production of knowledge about management that will improve the prospects for biodiversity.

5.5 Monitoring

Scale challenges and scale issues faced by the Finnish national biodiversity monitoring regime (for details, see Appendix 6) also stem from the same basis as the scale challenges in biodiversity governance. The challenges of the monitoring regime reflect the challenges brought up by the stakeholders of the focus groups, described above. Regional and spatial differences, time-scale issues, and protection 'in between' official conservation areas are related to the monitoring regime's capacity to adapt to new monitoring needs derived from either EU-driven biodiversity policy or domestic biodiversity policy. Also, the mismatches between ecological scales and scales related to human activities are considered here an important part of the question of adaptive qualities of the monitoring regime and the demand for building monitoring capacity. Biodiversity monitoring is challenged also by the need to be sensitive to the ecological scales that matter the most.

5.5.1 Challenges created by regional and spatial differences

Regional and spatial differences were seen to affect the scope of monitoring and the ability to monitor Natura areas. The differences between countries were seen as drivers that have effect on what each country wishes to be monitored at EU level. Denmark, Belgium, Holland, and Germany were seen as countries with good monitoring capacities by the representatives of the Finnish government agency. Finland, on the other hand, was considered a country of medium-level monitoring capacities, mostly on account of its vast surface area and small population. The small population of taxpayers was seen as having an influence on the monetary frame of monitoring and the amount of specialist labour available for monitoring. Some areas that should be monitored are hard to reach, because they are not near cities or research stations or might not be covered by the Forest and Park Service's monitoring. The problem of the large scale to be monitored includes biotopes that are hard to determine via remote sensing, islands that are expensive to visit, and species that are hard to detect in nature and in which only a few experts in the whole country specialise. 'Our parks can be bigger than the smallest Member States, which tells about the scale difference', said a representative of the government agency when describing the difference between Finland and other Member States.

It was thought that the issue of regional and spatial differences between Member States is considered and managed in the EU where assessment of Favourable Conservation Status (FCS) is concerned.

> MON 2: *Yes, it* [differences between Member States] *is to some extent taken care of; work groups exist wherein these guidelines* [for FCS and its reporting] *are edited and the representatives of Member States are there* […] *these* [targets for information accuracy] *have been set at a level most Member States should be able to cope with.*

During the first round of reporting for assessment of Favourable Conservation Status, the Member States had reported their results in various ways, which had made the results hard to compare for development of more information on large-scale trends in biodiversity issues in the EU. Both representatives of government agencies discussed the question of a common scale that all Member States should use when reporting results of FCS assessment to the EU. It was stated that differences in the spatial scale of biotypes typical of different bio-geographical regions vary greatly and might lead Finland to increase the usage of expert

interpretation of the data gathered, in order to be able to force Finnish information into the shared reporting scale, if the common grid for reporting on the results were to be small when compared to the large overall spatial scale to be monitored.

Although the problem of reporting had been worked on, the differences between countries were still seen as a large governance challenge that has an effect on all EU-level decisions related to biodiversity conservation and protection. Tackling the problem and being able to adjust EU-based policies to national capacities and needs was seen as necessary and efficient but also as something that might slow the development of rules for policy implementation.

Despite the challenging side of spatial and regional differences, the differences between countries were also seen as assets in the search for practices that could be transposed to the Finnish context in development of the national monitoring regime. Both representatives of government agency gave examples of countries that had managed some part of their monitoring admirably. The UK's remote-sensing-based countryside survey was considered a fine example of a method that could be used to patch the scope of the Finnish National Forest Inventory (NFI) on the biotope front. Estonian biotope mapping and German monitoring methods were also seen as well developed and interesting. Sweden was mentioned too as an example of a country that has financed a national monitoring regime that is developing admirably:

> MON 2: *They* [the Swedes] *started later to think about this* [biotope mapping], *but when they start something, they have good resources to do it with. Because of that, they have gone ahead with full steam in assessing all that should be considered, and what their monitoring system is going to be like.*

5.5.2 Shared tools and co-operation

Consideration of FCS was seen as an instrument for a larger-scale approach to European biodiversity monitoring and a tool for obtaining information on how well European nature protection policy has succeeded. The first round of FCS assessment was considered a stressful process for the people working in the national unit that had to co-ordinate the collection of information in Finland, but it was also mentioned in a positive light as a process of learning.

Other European large-scale approaches to biodiversity monitoring include bird-monitoring arrangements and the need for climate-change impact monitoring. One interviewee brought up the negotiations for bird monitoring between EU and BirdLife International. Because BirdLife International gathers information on birds in a more uniform way throughout Europe than individual Member States do, this NGO could collect data from different countries, with the government agencies only verifying the measurements before their delivery to the EU. Climate change, perceived as a large-scale monitoring need, could be best responded to through monitoring of species and habitats in long time series, for assessment of what is happening to populations over time, according to the interviewees.

The challenge of the differences between countries was seen as related to taking ecological scales into consideration when designing, setting up, or using shared monitoring and reporting tools. Co-operation with other boreal countries was seen in Finland as a good way to influence EU-based monitoring regimes and to resolve issues that were thought to be of mutual interest to countries belonging to the boreal region. One of the interviewees described

boreal-zone collaboration as a good way 'to ponder together critical and shared issues of reporting to the EU'. He also stated that boreal co-operation had been praised quite a lot and had received praise from even the European Commission and the European Topic Centre on Biological Diversity (ETC-BD). Although the co-operation within the boreal region was considered fruitful, this interviewee was sceptical about attempts to build shared indicator tools for boreal countries. Some of the monitoring tools and indicator sets developed that could be shared by several EU countries were viewed with similar scepticism, because they were developed for certain bio-geographical conditions and might not work in others.

MON 1: *We have tried unifying some of the things related to monitoring, and when we were thinking about what species are common for certain habitat types, we noticed that even between southern and northern Finland we couldn't go along with the same scheme, and, so, especially if we are talking about sets of indicators, then I do not think so. That would be wasting effort. When we do things, it is better that we do them precisely and properly, and use local information as the basis.*

The efficiency of sharing biodiversity indicators throughout Europe – i.e., using specific species such as the vascular plants to reflect forest biodiversity richness – was questioned in the case of boreal forests. An interviewee from the government agency described using such indicators as 'trying to go from where the fence is at its lowest and trying to act cost-effectively at the expense of accuracy of the information'. He also argued that, even though indicators such as vascular plants might tell about species richness in some cases, such indicators would fail to show when something is missing from the full tapestry of richness and ends up extinct.

The monetary frame of national monitoring was seen as having an effect on how shared tools could be employed in the Finnish monitoring context.

MON 2: *With regard to the earlier part of this discussion* [on the tight monetary framework], *it* [employing monitoring tools developed in EU research programmes] *hasn't been possible for us.*

One representative of the government agency stated that being able to use new monitoring tools might lead to trading off some of the efficient, good, and tested tools developed in the domestic monitoring regime. Experience with domestic monitoring tools and schemes has been developed over many years and, so, the methodology had become advanced and kept evolving. A mark of the high quality of the domestic monitoring tools was their procedural instructions, which were known to have been referred to internationally.

The main question about using tools developed elsewhere seemed to be that of having enough resources to alter and modify them such that they would work in Finland's domestic ecological conditions. With enough funding and academic and volunteer interest, good results had been reached with adaptation of the butterfly, moth, and bat monitoring schemes to domestic conditions. Moth methodologies have been exported from Finland to Russia and Estonia.

Developments, for example, on the bat front were seen by the interviewees as a good example of scale challenges that the domestic monitoring regime has tried to resolve by employing methodologies developed elsewhere to a Finnish context. Bats themselves present scale challenges in terms of both spatial scales and time scales, because there are seasonal changes in their occurrence. Many species of bats migrate annually to and from maternity

roost sites, mating sites, and winter hibernation sites and in doing so might cross national boundaries. Their migration has to be monitored without interference arising from the observations of the local bats. The protection of bats also requires knowledge both of the roosting and hibernation sites and of when the bats use them, as well as of the routes that the bats take when migrating (Battersby, 2010).

As for other forms of co-operation, the North European and Baltic Network on Invasive Alien Species (NOBANIS), the monitoring of the seals of Baltic Sea, the monitoring of the Arctic fox in Scandinavia, and the Arctic Council's Conservation of Arctic Flora and Fauna (CAFF) were mentioned.

In Finland, the problems with the large area to be monitored, small number of specialists, and tight monetary constraints have led to the development of cost-effective means to overcome these scale issues. Increasing voluntary work was seen as one way to expand the scope of monitoring without crossing the budget or other funding limits of the government agencies in the domestic monitoring regime. These include the future development of Internet platforms and software for volunteers that feature easy reporting. The main requirement for such a system was seen by the interviewees as being that it allow the reporting party to view the larger body of data collected. This was seen as a good way to 'take good care of the observers', 'thank them for their efforts', and 'make sure they would also be able to enjoy the fruits of their work'. The Finnish Museum of Natural History's Hatikka software was seen as a step in the right direction. It was also stressed that all branches of the administrative sectors responsible for monitoring biodiversity should be able to access the reporting platforms developed and collect the data needed through them, with ease.

The representatives of the government agency highlighted that, for civil society to collaborate with the administration in the monitoring field, the administration should improve the communication connections to the direction of the active members of civil society. Although the reporting platforms should be worked on, techniques for volunteers' assistance in measurement tasks have already been developed. One of these techniques was the 'game triangle', which has been tried with success. The game triangle is an observation method that volunteer hunters can take part in and that allows the administration to collect data on species that move about in forested areas during wintertime. The game triangle's best quality is that it is a method that yields comprehensive regional and national statistics but can be applied with a volunteer workforce.

The representatives of the government agency both emphasised that, although good results had been achieved in collaborative work with volunteers and although good results were expected also for the future, increases in volunteer work still have limits where domestic and EU-based monitoring needs are concerned. Volunteers' interests were seen as a major factor constraining their use for assistance in monitoring – the administration cannot simply tell volunteers what they should be interested in. In consequence, some species aren't covered by interested amateurs. Also, some species are so hard to detect that their monitoring demands specialist workers. Biotopes were considered something only administration can handle.

5.5.3 What should be measured

In view of the interviews, ecological theory and creation of ecological knowledge could be seen as evolving processes of conceptualising nature. These processes produce concepts that serve as filters for monitoring. The concept-based filters can be seen, in turn, as scale

construction material, because they determine what is supposed to be measured. Thus the scope of what is measured and what has been measured so far is closely linked to the time scale of ecological knowledge creation but also to the measurement needs, practices, and options, which then create the actual scale of what is monitored. A representative of the government agency described the process by speaking of how biological monitoring needs of administrative sectors had evolved and merged.

> GOV 2: *In the beginning of the '90s* […], *my main topic was biological monitoring and how it could be enhanced, especially in the sector of environmental administration, because back then we had lots of physical and chemical monitoring – that comes from the history of the old water administration* […] *– but biological monitoring we didn't have, almost at all. Then at some point came the term 'biodiversity' and the topic was changed to biodiversity monitoring, naturally. And we had few projects, mostly research and pilot projects, in the '90s and at the start of the 21st century. At some point, because we have lots of other institutions, who also monitor biodiversity, who carry out biological species monitoring, mostly* […], *then we had these working groups, which included people from different institutions – and we pondered it together: how could we get the joint benefits out of all the monitoring all these institutions do*? […] *This has been in our own sector. In the sector of administration of the Ministry of Agriculture and Forestry, the institutions, they have this so-called monitoring of natural resources, which is biological monitoring and monitoring produced out of biodiversity, and it has a long history. The way they monitor game stock, and how much the game stock can be used, tells at the same time what the state of the game species is. It outputs the biological state, although the motive for them to do it is to know how much these can be hunted, or whether they can be, or how much wood can be cut from the forestry resources. And then we get information on the variables, which tells about the state of biodiversity. But at our administration* […] *the change has been mostly that we have realised that all of these are- that along came this biodiversity and it is this larger picture and the habitats belong to the picture too.*

The division of monitoring duties by sector had produced different monitoring systems, which couldn't be combined as well as desired. This is one reason the problems of time scale are closely linked to monitoring. A monitoring regime needs data that are comparable in time but also the time to develop systems that are able to gather the information. Also it needs time to combine assets.

As the process of ecological knowledge creation moves forward, the administration faces new problems with the expanding scope of what can and could be measured and monitored. The broadening of the choice base has brought about more needs for measurement and development of a dilemma about choosing what should be measured, as it is clear that it isn't possible to measure everything. Possible new interests of the EU monitoring regime, such as ecosystem services, were considered partly to be threats to the domestic monitoring regime, because the regime has had to be able to cope within a tight monetary framework. If monitoring something new becomes compulsory, that might lead to a situation in which the list of things monitored now should be pared back. On the other hand, growing EU demands for monitoring and the assessment of FCS were seen as pushing Member States forward to develop their domestic monitoring. As the main obstacles in monitoring of ecosystem services a representative of the government agency saw the fickle meaning of the concept of ecosystem services and the possible trade-off in moving from monitoring

of rare species to monitoring of the easily monitored common ones. Because the goal of monitoring is to be able to preserve and conserve the threatened species too, considering, for example, pollinators as only a service could lead to the main goal of pollinator monitoring turning into monitoring of species that aren't rare, as another interviewee (MON 1) suggested. Because ecological knowledge creation was seen as moving from observations to explanation of small events and then to explanation of larger ones, a representative of the government agency (MON 2) suggested that monitoring of ecosystem services would require more monitoring of culmination points of ecosystems. Monitoring the hymenoptera, which are pollinators, and monitoring the soil organisms and decomposers could be good choices of monitoring targets if one wants to increase knowledge of ecosystem functions. In Finland, both proposed targets of monitoring were seen as problematic because of the absence of specialists and of funding. Monitoring the hymenoptera and decomposers was seen as a project with a long time scale and as something that should be built from the ground up.

Both of the government-agency representatives argued that, to enable monitoring of ecosystem services and invasive alien species, the monitoring resources should be increased, but not with reallocation of the existing resources, as the latter could lead to negative trade-offs with respect to monitoring capacity and the comparability of data over time. It was stated by the other representative of the government agency that the monitoring practices under environmental administration had been hit hard by the state's cost-efficiency procedures over the last 10 years, although new EU-based monitoring requirements have emerged and require a response. Here one cross-scale linkage can be found – the scope of monitoring and the number of ecological scales monitored are closely linked to the monetary frame of administration, which is linked to other processes of society.

Because the ecological scales that can be considered as a basis for measurement are vast and various, attempts have been made to produce shared monitoring schemes such as the assessment of Favourable Conservation Status throughout Europe so as to allow viewing biodiversity issues with a large-scale approach. Also shared monitoring tools such as indicators are being developed, for decreasing the amount that has to be measured as the basis for intelligent decision-making on steering of society in such a way as to halt the loss of biodiversity. Despite the evolving ecological knowledge base, the growing range of options for measurement, the larger-scale approaches, and the tool kits for monitoring, scale challenges are still faced by the national and EU-based monitoring regimes and should be taken into account when new monitoring needs and schemes are introduced, discussed, and agreed on. Also, resolving some of the scale challenges of monitoring and being able to monitor more requires resource input early in the activities even though output of achievements might have to wait longer.

5.6 Conclusions on empirical findings

In the section concluding this chapter, we draw together the findings presented in the previous sections. We begin by describing site selection, connectivity, and monitoring issues from the perspective of the changes in forest biodiversity governance over the last few decades in Finland. Then, we crystallise aspects of scales – temporal, spatial, ecological, and jurisdictional scales as well as social cross-scale linkages – found in the focus-group discussions and interviews. We conclude with some general notions pertaining to scales.

5.6.1 Site selection

Natura 2000 has been an essential element in generation of policy change in Finland. On one hand, the implementation of the Natura network improved the protected-area network remarkably and contributed to reaching of nature conservation goals. On the other hand, the implementation caused the extremely serious conflict that prompted many land-owners to question the legitimacy of nature conservation and consequently debilitated Natura in Finland for many years. In particular, the top-down policy approach used in the selection of Natura 2000 sites and in the implementation of the network in general was criticised. Later, however, the conflict encouraged considerable changes for biodiversity conservation, especially for forest biodiversity conservation.

The key principles in new legitimate biodiversity policy for site selection emerging from the policy learning process after Natura 2000 are that conservation is based on voluntary, temporary, and well-paying contracts. Many land-owners appreciate such contracts (Paloniemi & Tikka, 2008), and today biodiversity policy is also considered legitimate in general discussion. In addition, policy learning processes have encouraged authorities in different administrative sectors (especially environment-related ones and the forestry and agricultural sectors) to co-operate in a more deliberative manner, and to develop new conservation instruments and initiatives together.

A new approach to biodiversity policy that focuses on the involvement of land-owners, offering forest sites to be selected as temporary conservation areas, imposes new demands for the interpretation of ecological knowledge. On one hand, environmental and forestry officials may allocate conservation funding for specific hotspot areas of biodiversity or otherwise important areas. These areas can be found on the basis of, for example, conservation biological algorithms used in Finland, such as Zonation (Lehtomäki, 2009). In the use of these algorithms, an essential role is to be found in the valuation of complex ecological knowledge, which, in the context of the METSO programme, has been done through expert workshops. On the other hand, in negotiations with land-owners on conservation aims and practices, ecological knowledge receives a different role. The dominant position of ecological knowledge is shifting toward being a dialectical and deliberative process, in which ecological *and* lay knowledge, as well as interests of stakeholders, are appreciated and combined, and such synthesis serves as a foundation on which contracts are agreed upon on a voluntary basis between land-owners and authorities.

5.6.2 Connectivity

The issue of connectivity emerged in biodiversity policy discussion at least a decade ago, although the policies with which to tackle the issue are not well developed. One key policy trend for the near future seems to be a move toward more integrated biodiversity policy (Heikkinen, 2007). This trend brings the focus to scale-sensitivity, because it will make governance more complex in terms of the areas of policy, goals, actor networks, interests, and technologies involved.

The debate about how to benefit from land-use plans in biodiversity conservation indicates one of the key problems in wrestling with the connectivity issue. Land-use plans have not been widely used to govern other large semi-natural areas than shores, thus for example forests, where the majority of Finland's threatened biodiversity occurs, have not been governed these planning instruments and accordingly broadening the scope of application to

encompass such areas would be a significant policy change. Those promoting more effective biodiversity conservation policies consider the planning process to be an attractive policy instrument because it makes it possible to govern large areas. Those approaching it from land-owners' perspective oppose the application of land-use restrictions without full and immediate compensation. This conflict may significantly limit the possibilities for using planning as a co-ordinating instrument and emphasise the importance of mainstreaming biodiversity policy into policies for the use of natural resources. Informal biodiversity 'land-use planning' can be seen springing up with the METSO programme, when possible protection areas taking issues of river-basin connectivity into account are planned beforehand by those in regional administration on the basis of large-scale GIS studies. Whether or not this kind of connectivity-based planning, which is voluntary for land-owners and therefore considered legitimate site selection procedure, is going to fit the governmental funding framework for a long time remains to be seen. It can still be argued that the policy style and policy framework with respect to site selection has changed from those of the past.

The question of connectivity removes some responsibilities of biodiversity conservation also for other policy sectors, beside the environmental sector. Currently, many natural-resources policy instruments acknowledge the need to conserve biodiversity. For example, forest certification and organic farming do carry such responsibility, but they do so only on a marginal scale, while certification limits forestry only a little and the proportion of organic farming to the total amount of agricultural land is fairly low.

The most relevant 'other sectors' of Finnish biodiversity policy – agriculture and forestry – are undergoing major structural changes (Lehtinen et al., 2004; Hetemäki, 2011) for economic, industrial, and productive reasons, which creates both opportunities and challenges for the mainstreaming of biodiversity policy. Exclusion of the perverse incentives of agriculture and forestry could be one essential step for encouragement of such a mainstreaming process.

The role of ecological knowledge is different, but still extremely essential, in the case of integrated policies. When integrating biodiversity conservation into other sectors' operations, various actors and stakeholders having diverse interests and wishes carry out joint negotiations collaboratively and deliberatively. The essential question is this: what is the role of ecological knowledge in these processes, and what are the prerequisites for inclusion of ecological knowledge in such processes? Given that both integrative processes and ecological knowledge are dynamic and complex, those who transpose ecological knowledge into such integration processes have to admit the uncertainty and non-linearity of said processes and must prepare themselves for including the knowledge in the processes through, for example, prioritisation of actions.

5.6.3 Scale-related perspectives

In this section, we list five conclusions on the perspectives related to scales that were found in the empirical part of the study – namely, issues related to temporal, spatial, ecological, and jurisdictional scales as well as those relevant in terms of social cross-scale linkages.

1 Temporal scale
    a. Practices of biodiversity conservation were described as shifting from single-event in focus (such as launching of massive conservation programmes) toward a more procedural, negotiation-style approach (such as the multiple,

smaller contracts made in METSO)
   b. Accumulation and intensification of ecological knowledge were described in terms of monitoring; changing knowledge was described as something bringing new areas, units, and spaces under examination and to be set as targets of monitoring
   c. Learning processes were described as occurring before and after specific events; this enabled participants to step beyond chronological time and form a narrative, in favour of a kairological, eventful, ruptural, and creative kind of time (cf. Casarino & Negri, 2008)

2 Spatial scale
   a. The change in site selection regimes has resulted in a situation in which the new sites selected have, on average, become smaller than before but the total number of areas selected has increased (earlier, large national parks were established whereas today's protected areas are small but numerous)
   b. Simultaneously, the progress of intensification in the forestry and agricultural sector has led to a more fragmented landscape (creating challenges of connectivity outside the protected areas)
   c. Even though new EU-wide strategies and national instruments focusing on conservation of biodiversity (such as the Water Framework Directive and planning instruments) do, in principle, cover large areas, many concrete protective measures focus only on well-defined small targets (e.g., Forest Act habitats are strictly defined sites) and there still are very few horizontal measures that affect broadly different kinds of activities in forests, on agricultural land, or anywhere else

3 Ecological scale – ecological coherence and connectivity
   a. The power of setting the ecological criteria for biodiversity conservation has remained at the *national level* (it is defined in the Nature Conservation Act and the Nature Conservation Decree, as well as in the national METSO programme) or rests with decisions made at *EU level* (e.g., for species covered by the Birds Directive or the Habitats Directive)
   b. Regional and local-level actors play a greater role in policy implementation: on one hand, regional forestry and environmental authorities address nationally defined ecological criteria of the METSO programme in local circumstances (in some cases, analysing the connectivity of the areas on the basis of regional-scale GIS) and negotiate with land-owners about addressing the ecological criteria in practice and on the value of the land-owners' sites on the basis of the criteria; on the other hand, local land-owners offer sites for conservation on the basis of their local (lay, ecological, and forestry) knowledge and then, through a collaborative process between land-owner and authority, details of the conservation contract are negotiated before, finally, land-owners voluntarily participate in the conservation programme or reject the contract
   c. While ecological knowledge is becoming more complex, the importance of its evaluation simultaneously is growing more urgent (in the context of monitoring targets such as ecosystem services, a huge amount of information has to be managed and assigned a value)

4 Jurisdictional scale
   a. Both EU and national policies local contexts, which is why local relationships of actors can either enable or restrict policy implementation – for example, the LEADER project, an EU-wide instrument, operating at province level, was interpreted in Finland in a bureaucratic and strict manner, causing local actors to lose their interest in participation in such projects after their first experiences, and, in addition, different authorities can be strict and bureaucratic in different ways (for example, regional environmental authorities were considered to be less bureaucratic than a regional union of municipalities in some cases) – and the nature of the relationships between regional authorities or their relationships with local actors in each local case can either enable or restrict the processes of implementation of the policies
   b. Different authorities affecting the implementation of biodiversity policies have different institutional procedures, rules, and practices, for which reason a land-owner may choose to be in contact with either the forest or the nature conservation authority, depending on which he or she trusts and who he or she thinks mirrors his or her views about conservation (Paloniemi & Vainio, 2011); from the actor's perspective, the current process of moving toward many jurisdictions, at different levels, is beneficial and offers more options
   c. Within jurisdictional scales, the EU can and will set principles to national level and national authorities transpose them into the national legal system, after which regional and local authorities implement them with regional and local actors, a context in which the central roles of local and regional actors in the implementation are thought to increase connectivity and perceptions of legitimacy (see also the notes on ecological scales, under 3b, above); however, experts in the focus group argued that such roles might also cause problems, if the 'local' is thought of as a separate entity without connections to larger outside phenomenon, because implementation principles originating elsewhere might be interpreted too strictly, in which case the local ends up without possibilities for advancing its policy-related emergent potential

5 Social cross-scale linkages
   a. *Networks*: In the process leading toward more complicated networks of public and private relationships, the relevant questions include what kind(s) of position(s) the land-owners receive in the context of jurisdiction as negotiation partners with environmental and forestry authorities and whether authorities exert force on land-owners in the spirit of command and control or, instead, the parties discuss things with each other in a deliberative mode (it is worth noting that longer time spans in networks build trust (for example, many land-owners appreciate the possibility of co-operating with forestry authorities on conservation issues as they have done before in relation to forestry questions) and enable adaptability – for example, encouraging authorities to compromise on question relevant for other sectors)
   b. *Policy learning*: Many signs of progress from conflict to legitimate conservation procedures, strategies, and practices were found (in this connection, we refer also to what kinds of new instruments have been developed and to how they respond to the scale challenges)
      i. Bottom-up development of instruments
      ii. Instruments that increase perceived legitimacy among land-owners

iii. Instruments that govern conservation of biodiversity (i.e., of habitat and species) that exists between jurisdictional scales (such as on borders between forest land and field)
iv. Instruments with various time scales, meeting different desires and needs of various types of land-owners
v. Instruments that encourage land-owners to take pro-conservation action and learn from their own efforts, and instruments that take into account small- and large-scale ecological phenomena (see ecological scale 3, above)

c. *Scale framing*: This is used as discursive practice – i.e., for determining the spatial, temporal, ecological, and jurisdictional scales that matter – which sets in place the boundaries of 'what/who is included' and 'what/who is not'
   i. Spatial scale: How extensive is the problem or the area (for example, presenting organic agriculture as having potential as a large-scale solution to biodiversity protection problems in all field land)?
   ii. Temporal scale: What is the time scale of conservation?
   iii. Ecological scale: What is the most relevant 'scale' for solving the chosen problem of biodiversity conservation?
   iv. Jurisdictional scale: Whose task is it to tackle the various problems of biodiversity conservation, and to whose jurisdiction does the issue belong (for example, asking those responsible for planning to take care of connectivity issues or highlighting specific legal principles (such as private ownership) as elements that should be considered as a basis for decisions)

6. Conclusion

In the study, we have explored the developments in the Finnish regulatory regime of biodiversity conservation by focusing on the ecosystems of forests, agricultural land, and mires. We have presented the main governance challenges of the last 15–20 years and those of today. In addition, we have presented how the stakeholders of biodiversity governance perceive such a state of the art. Next, we briefly present a summary and conclusions from our findings and look at possibilities for more scale-sensitive biodiversity governance of the future.

6.1 Scale issues in regulatory regimes

There have been certain scale challenges in governing policy and practices related to protection and management of forests, agricultural land, and mires in recent decades. For example, forestry practices have been discussed from the perspectives of whether the current large-scale clear-cut forestry or alternative small-scale practices are more optimal for biodiversity; in the agricultural context, traditional wooded biotopes (previously or currently grazed wooded pastures) have declined in consequence of the separation of agriculture and forestry into two, strictly divided sectors; and the succession stages of mires challenge protection to take into consideration both young and mature stages of biotopes (which encourages an actor to acknowledge the dynamics of nature).

The administrative resources of biodiversity conservation have declined when calculated in terms of personnel working years. In the ’90s, when the Finnish regional environmental centres were established, the environmental administration employed more personnel than today, although many project workers are employed today. Following the ideology of new public management, citizens have received the role of a customer and, at the same time, one of information provider as well as an assistant in monitoring and management.

The main nature conservation instruments have been i) the establishment of conservation programmes targeting protected areas and ii) protection in the context of land-use planning and projects. Today the option for conservation programmes is still open and discussed in the case of mire protection. However, the primary approach currently is based on negotiation and a voluntary approach, underscored especially in the forest biodiversity programme for southern Finland (i.e., METSO). Moreover, an important challenge in governance has been seen in the discrepancy between strict rules implemented in a top-down manner (which don’t necessarily allow freedom for local initiatives and applications) on one hand and emphasis on case-sensitive adaptive learning in a bottom-up mode (which isn’t necessarily able to mobilise enough resources and to cover large, national areas) on the other. Both questions are connected with site selection and monitoring. First, top-down implementation can suffer from serious resistance, which in the worst case can lead to loss of biodiversity in the targeted area and long-lasting mistrust in administration and in administrative procedures. Second, if knowledge concerning species, sites, and drivers comes from various sources that have not been systematically selected, a challenge arises in how it is possible to manage the big picture. Third, in balancing between the two alternatives of top-down and bottom-up, questions such as who bears the responsibility for collecting and producing information and who has the rights to value information and make decisions about conservation aims, needs, and practices become crucial.

Current elements of challenge in the management of conservation areas are the issues connected to administrative resources and to involving potential actors and getting them

committed to the responsibilities. In addition, with respect to the management, one must take into account that site selection is not enough to preserve the values of the site, but site designation is needed (even though it demands even more resources) and that the developments outside the protected areas need to be considered.

One challenge faced in the integrative conservation has been that of combining sector-level knowledge and rules to enhance biodiversity conservation in areas that are in economic use. Another challenge has been the possibilities and limitations related to accounting for conservation aims in the context of land-use planning. Even though there are huge hopes placed in planning, there is some strong resistance and fear of large-scale planning tools.

In governance related to the biodiversity policy implementation demands coming from EU level, the main question lay in conservation options: the implementation of the Birds Directive and the Habitats Directive, as well as future conservation tools such as Green Infrastructure and its national applications. Not all habitats apart from forests have been as intensively monitored. Similarly, interested amateurs can cover common and easily noticeable species (such as birds and butterflies), and, accordingly, if monitoring is directed toward the voluntary approach, these species groups will get more attention than others do. Where Green Infrastructure is concerned, there are few references so far; potential exists for more integrative approaches already in the current tools, if the interplay of the actors is given time and resources and support is provided for their development in a more adaptive direction.

There are various scale challenges connected to site selection, connectivity, and monitoring. Thanks to the policy learning and interplay of different actors, some answers for these challenges have emerged. Therefore, the scale-sensitivity – perhaps even scale-effectiveness – of biodiversity policies has increased. To demonstrate such progress, we provide Table 13, which briefly describes three examples of this development within current biodiversity policy.

Table 13: Scale issues in site selection, connectivity, and monitoring of current biodiversity policy in Finland

	Scale challenges	Learning and interplay
Site selection	Mismatch of local perceptions and national aspirations	METSO and co-operation of forest-owners and forestry administration where temporary and voluntary conservation is concerned
Connectivity	*Conservation network* Historical background (placement of the sites)	The support of other instruments than conservation ones and integration of environmental policy Difficulties with such interplay
Monitoring	Voluntary action and its co-ordination	Internet applications in supporting open data structures Difficulties in covering some elements (e.g., rare species and habitats) and in getting people committed to long-term periodical monitoring as well as obtaining data from sparsely populated areas

6.2 Toward scale-sensitiveness?

The positive examples of biodiversity policy in Finland described in the study, such as METSO program, protection of Siberian flying squirrel and landscape ecological planning made by Forest and Park Service, present learning processes that have increased scale-sensitivity in biodiversity conservation. However, it is worth noting that these examples do not produce a dichotomy between sensitive and non-sensitive. Rather, the examples indicate some adaptiveness and some rigidity within biodiversity conservation practices. Both as-

pects are relevant if biodiversity policy and implementation practices are to work better than they do currently.

The changing policy regimes and practices of biodiversity policy produce new scales and make new scales relevant, as described in the study. New approaches – both new ways of selecting and concluding contracts for conservation areas and ways of increasing connectivity through integration of biodiversity policy into other sectors of society – seem to feature attempts at more scale-sensitive policies than the old top-down approaches of biodiversity conservation. However, there is variation within these new approaches. All practices are more sensitive to some scales and less to others. Probably, it would be difficult to find an instrument that could be sensitive to all – or even most – scales explored in this report.

This, however, in no way denigrates the importance of exploring the scale-sensitivity of biodiversity governance and specific policy instruments. Instead, the finding of differences in scale-sensitivity challenges us to explore such variation *within* scale- sensitivity and to ask *to which scales* biodiversity policies and instruments are sensitive and to which not, as well as, moreover, *why* that is and *how* such sensitivities to various scales could be encouraged. In all of the focus-group discussions, it was argued that the problem of biodiversity conservation is not in people or in administrative structure as such; people can be – and indeed have been – encouraged to work together, and incentives can be – and have been – used to support the actions that are asked for. The problem is somehow 'deeper', in the 'aims' and 'approaches', or even in 'ideologies' or '(ir)rationalities' intertwined with practices.

From the perspective of policy recommendation, a huge challenge is the fact that it's impossible to name a single policy mix – not to mention policy instrument – that could solve all, or even most, biodiversity problems. Green Infrastructure – a policy initiative soon to be officially launched at EU level – seems to be a promising way to encounter larger spatial scales beside local spaces and thus operate as a co-ordination structure for scale-sensitive policy mixes covering both site selection and connectivity. However, within the Green Infrastructure approach, many questions remain, such as how Green Infrastructure is defined and evaluated (in terms of the role of ecological and lay knowledge); what the roles of current – and changing – instruments (e.g., various planning instruments, incentives, and permits) are; and how the complex overall entity is evolving from all of these as understood, evaluated, and co-ordinated in practice.

The complexities, integrative approaches, and interplay are essential concepts in analysis of the scales of biodiversity policies. What are the challenges that enter in from the areas at which conservation is aimed (ecological and social system, practices, and interests of individuals), what are the challenges coming from outside (upper-level policy aims, international market forces, and laws), and how do they interact? Such dynamic and process approaches aid in analysis of how scales are realised and, especially, how scale-related challenges can be overcome through learning during these processes. Also, some possible concrete arenas for such learning were found in the course of the discussions; among other things, integrative policies and planning procedures were seen as promising ways out, although they were seen to have their problems also.

7. Acknowledgements

We express particular gratitude to the participants in the focus groups, the interviews, and the expert roundtable for their significant support in gathering the 'big picture' of scale challenges of Finnish biodiversity governance. This work was funded by the SCALES project (Securing the Conservation of biodiversity cross Administrative Levels and spatial, temporal and Ecological Scales) funded by the European Commission as a Large-scale Integrating Project within FP 7 under grant 226 852.

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APPENDICES

Appendix 1: The history of establishment of conservation areas on state-owned lands in Finland (land areas given in hectares), based on *Ympäristöhallinnon toimintakertomus 1996–2003* **and** *Statistical Yearbook of Forestry, 2004–2009*

	1.1.1996	1.1.1997	31.12.1997	31.12.1998	1.1.2000	1.1.2001	1.1.2002	1.1.2003	1.1.2004	1.1.2005	1.1.2006	1.1.2007	1.1.2008	1.1.2009
	1996	1997	1998	1999	2000	2001	2001	2003	2004	2005	2006	2007	2008	2009
National parks	679,000	681,600	684,200	684,200	688,900	721,500	726,500	730,800	735,500	737,500	797,000	798,800	799,400	799,400
Strict nature reserves	149,000	149,000	149,000	149,000	149,300	149,700	150,200	150,800	150,800	151,000	151,000	150,900	151,000	151,000
Mires	405,000	405,000	405,000	405,000	409,500	410,800	423,700	437,600	437,600	441,900	442,400	447,700	448,600	448,600
Bird wetlands	600	600	600	600	600	600	0	0	0	0	0	0	0	0
Herb-rich woodland	1,200	1,200	1,200	1,200	1,230	1,230	1,290	1,250	1,250	1,200	1,300	1,200	1,200	1,200
Shorelines	100	100	100	100	100	100	0	0	0	0	0	0	0	0
Old-growth forests	9,000	9,000	9,000	9,000	9,600	9,600	10,500	9,800	9,800	9,800	10,200	10,000	9,200	9,200
Wilderness areas	1,378,200	1,377,800	1,377,800	1,377,800	1,377,800	1,379,000	1,379,000	1,379,000	1,379,000	1,379,000	1,379,000	1,379,000	1,379,000	1,379,000
Other conservation areas	45,700	44,800	44,800	44,800	45,300	40,500	40,900	41,400	38,800	39,000	39,800	40,400	41,800	40,400
New Natura 2000 areas					0	0	0	0	0	0	0	0	0	0
Total	2,667,800	2,669,200	2,671,600	2,671,600	2,682,330	2,713,030	2,731,990	2,750,650	2,752,750	2,759,900	2,820,700	2,828,000	2830,200	2870,600

Appendix 2: The history of establishment of conservation areas on privately owned lands in Finland (values given in hectares, with only land areas included, except for the bird wetlands, for which water areas are included for 2004–2006, for statistical reasons), based on *Ympäristöhallinnon toimintakertomus 1996–2003* and *Statistical Yearbook of Forestry 2004–2009*

	1.1.1996	1.1.1997	31.12.1997	31.12.1998	1.1.2000	1.1.2001	1.1.2002	1.1.2003	1.1.2004	1.1.2005	1.1.2006	1.1.2007	1.1.2008	1.1.2009
	1996	1997	1998	1999	2000	2001	2001	2003	2004	2005	2006	2007	2008	2009
National parks	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Strict nature reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mires	5,500	5,600	5,700	5,860	6,560	7,360	7,960	8,600	9,900	11,500	13,200	13,300	13,300	16,200
Bird wetlands	2,000	4,200	4,400	5,250	6,000	6,800	7,200	8,400	19,200	30,900	39,200	10,900	14,000	15,800
Herb-rich woodland	800	900	1,000	1,030	1,190	1,440	1,540	1,640	1,700	1,800	1,900	1,700	1,600	1,600
Shorelines	2,900	4,200	5,500	8,140	9,740	11,640	14,140	18,300	18,700	20,400	21,700	23,300	24,700	25,800
Old-growth forests	100	400	800	1,050	1,190	1,430	1,530	1,530	2,000	2,000	2,200	2,300	2,700	3,000
Wilderness areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other conservation areas	0	14,900	15,200	15,370	16,320	17,020	17,020	18,310	19,000	27,600	28,400	31,400	28,300	28,800
New Natura 2000 areas					900	1,370	1,870	2,620	4,700	5,400	6,300	6,300	7,300	8,200
Total	11,300	30,200	32,500	36,800	41,900	47,060	51,260	59,400	75,200	99,600	112,800	89,200	91,900	99,300

The Act on Support for Rural Development was established in 2006. It aims to 'diversify the economic activities in the rural areas, improve the operating conditions and competitiveness of rural enterprises, promote the competitiveness of agricultural products and improve the quality of life of rural residents, in compliance with the principles of sustainable development' (SRDA, 1443/2006). The related co-ordination is handled by the Finnish Agricultural Administration (part of the Ministry of Agriculture and Forestry) and implemented by the Centres for Economic Development, Transport and the Environment (i.e., by regional employment and economic authorities).

The Forest Act was passed in 1996. It aims 'to promote economically, ecologically and socially sustainable management and utilisation of forests in order that the forests produce a good output in a sustainable way while their biological diversity is being maintained' (Forest Act, 1093/1996). Its enforcement is co-ordinated by the Forestry Administration (under the Ministry of Agriculture and Forestry) and implemented by forestry administration personnel (Regional Forestry Centres).
The Act on Environmental Impact Assessment Procedure was established in 1994. Its aim is 'to further the assessment of environmental impact and consistent consideration of this impact in planning and decision-making, and at the same time to increase the information available to citizens and their opportunities to participate'. These activities are co-ordinated by the Ministry of the Environment and the Centres for Economic Development, Transport and the Environment and implemented by the latter centres. Various actors are encouraged to participate in implementation of the procedure, with interaction in the assessment between the project developer and the co-ordinating authority, as well as with other authorities and those parties whose circumstances or interests may be affected by the project, along with corporations and foundations whose sector of operations may be affected by the project. Public announcement of the assessment procedure is made by the co-ordinating authority.

The Act on Wilderness Areas, passed in 1991, aims to ensure that wilderness areas can preserve their atmosphere and to guarantee preservation of the culture of the Sami people and natural source of livelihood, along with use of nature in a diversified mode (EL, 62/1991). Its enforcement is co-ordinated by the Environmental Administration (under the auspices of the Ministry of the Environment) and implemented by Metsähallitus.

The Hunting Act, in force since 1993, was designed for management of the hunting and killing of those animals not protected under the Nature Conservation Act (ML, 615/1993). Also where applicable, the Hunting Act applies to trapping and killing of mammals and birds that are protected under the Nature Conservation Act (ML, 615/1993). Work relatedto this act is co-ordinated by the Agriculture and Forestry Administration (under the Ministry of Agriculture and Forestry) and implemented by regional hunting organisation (*riistanhoitopiiri*) structures.

Permits granting exceptions to prohibitions covering protected areas are defined in the Nature Conservation Act. Finland's Nature Conservation Act includes legislation prohibiting certain activities in protected areas and in relation to protected species, in order to preserve biodiversity. In certain circumstances, however, exceptions to these prohibitions may be granted by the authorities. In protected areas, activities that would change the natural environment are generally prohibited. A blanket prohibition also covers activities that alter the state of protected biotopes or lead to deterioration or destruction of occurrences of species under special protection. Protected species in general are also covered by various prohibitions. State-owned protected areas established through acts or decrees include strict nature reserves, national parks, and other nature reserves. Nature reserves may also be designated on private land. Many protected areas are also part of the Natura 2000 network. Exceptional permits may be granted for hunting or trapping of wild animals, the collection of plants for research purposes, fishing, geological research, or mineral prospecting. Exceptional permits may be required even for entering some strictly protected areas. Exceptions are granted only where such activities do not endanger the objectives of the protected area concerned.

Permits for activities that alter protected biotopes are defined in the Nature Conservation Act. Biotopes protected under Finland's Nature Conservation Act include natural broad-leafed woodlands, hazel groves, common alder woods, natural sandy shores, seashore meadows, treeless or naturally sparsely wooded sand dunes, juniper meadows, pollarded meadows, and large trees or groups of large trees dominating open land-

scapes. Any activities that would endanger these features' natural characteristics are prohibited. Such prohibitions automatically come into force as soon as the regional environment centre delimits the designated biotope. Permits are needed only for activities that endanger the natural characteristics of such biotopes. If the prohibitions result in significant losses to the land-owner or tenant, full compensation may be obtained from the state.

Permits for activities affecting the occurrences of species under special protection are defined in the Nature Conservation Act. The Nature Conservation Act prohibits activities that would lead to deterioration or destruction of important occurrences of species in need of special protection – which are threatened species under evident threat of disappearance. Such prohibitions automatically come into force as soon as the regional environment centre delimits the designated occurrence of the species concerned. Exceptional permits may be granted for such activities as long as the conservation status of the species remains favourable. Breeding or resting sites of certain species are very strictly protected in practice, and exceptions are rarely granted. If such prohibitions result in significant losses to the land-owner or tenant, full compensation may be obtained from the state.

Permits granting exceptions related to protected species are defined in the Nature Conservation Act. All of Finland's wild mammals and birds are protected, except certain game species and a few other unprotected species. Prohibitions cover the deliberate killing, hunting, trapping, capture, or disturbance of these protected species, including their nests and eggs. Designated and marked trees where large birds of prey or other protected birds nest are also automatically protected. Protected plant species may not be picked, damaged, or otherwise harmed. These protective prohibitions do not, however, prevent farming, forestry, construction, or the use of buildings and equipment in the areas concerned, as long as damage or disturbance to protected species can be duly avoided without excessive expense. Exceptional permits may be granted in relation to the prohibitions covering protected species, as long as the conservation status of the species remains favourable.

Permits for the possession of dead animals of protected species are defined in the Nature Conservation Act. Individuals of protected species found dead may not be taken into the finder's possession. They may, however, be collected and delivered to natural history museums or to suitable scientific or educational institutions. This is often done, particularly in cases involving very rare species. Such specimens may be given to other parties under special authorisation. Permits for the possession, transportation, and exchange of certain animal and plant species and all wild bird species found in Finland are granted only under strictly defined conditions.

Permits for exceptions to the prohibition on activities affecting the occurrences of breeding or resting sites of species listed in Annex IV(a) of the EU Habitats Directive are provided for in the Nature Conservation Act. Activities that would harm or destroy breeding and resting sites of strictly protected species such as bears, lynxes, flying squirrels, and Saimaa ringed seals are forbidden. This prohibition covers all such sites, even if they have not been specifically designated. Exceptions to this prohibition are granted only under strictly defined conditions.

Permits related to threatened species and the EU internal market are specified in the Nature Conservation Act. Current EU legislation on international trade in endangered plants and animals is even stricter than CITES, described below. Import of specimens and products derived from certain species covered by the CITES convention is prohibited throughout the EU. All import, export, or re-export of specimens and products derived from endangered plants or animals to or from EU countries is controlled through import, export, and re-export permits and certificates, which are duly inspected by customs officials. EU certificates are required for certain types of specimens (e.g., bearskins and stuffed birds of prey) and for the sale or transfer of live specimens within the EU.

All of the permits described above are governed by the same procedure, co-ordinated by the Environmental Administration and the Centres for Economic Development, Transport and the Environment.

EU certification may be granted in relation to the **Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)**, from 1976, under Council Regulation (EC) 338/97's articles 8 and 9. The work is both co-ordinated and implemented by the Finnish Environment Institute. The purpose of the convention is to protect endangered species of fauna and flora through controls on international trade in specimens of endangered species.

Appendix 4: Biodiversity monitoring programmes and schemes in Finland (Finnish Environment Institute, 2008)

Monitoring programme/scheme	*Main responsible organiser / co-ordinator*
Insect survey	Finnish Museum of Natural History
Monitoring of macrozoobenthos in the Baltic Sea	Finnish Institute of Marine Research
Monitoring of zooplankton in the Baltic Sea	Finnish Institute of Marine Research
Biomonitoring of lakes	Finnish Environment Institute
National moth monitoring scheme	Finnish Environment Institute
The butterfly monitoring scheme in Finnish agricultural landscapes	Finnish Environment Institute
Monitoring of threatened orthoptera species	Group of experts on hemiptera
Monitoring of threatened heteroptera species	Group of experts on hemiptera
Monitoring of threatened homoptera species	Group of experts on hemiptera
Monitoring of threatened hymenoptera species	Group of experts on hymenoptera
Monitoring of threatened coleoptera species	Finnish Environment Institute
National butterfly monitoring	South Karelia Allergy and Environment Institute
Monitoring of phytoplankton in the Baltic Sea	Finnish Institute of Marine Research
Monitoring of threatened vascular plant species	Finnish Environment Institute
Weed survey in spring cereal fields	Agrifood Research Finland
Monitoring of coastal phytobenthos	Finnish Environment Institute
Monitoring of vascular plants covered by the EU`s Habitats Directive	Finnish Environment Institute
National Forest Inventory; forest resources inventory	Finnish Forest Research Institute
National Forest Inventory; monitoring of the health of forests	Finnish Forest Research Institute
Bird-ringing	Finnish Museum of Natural History
Raptor grid scheme	Finnish Museum of Natural History
Monitoring of ospreys	Finnish Museum of Natural History
Census of breeding land birds (long-term changes)	Finnish Museum of Natural History
Census of breeding land birds (yearly changes)	Finnish Museum of Natural History
Census of breeding waterfowl	Finnish Museum of Natural History
Monitoring of white-tailed eagle	WWF Finland
Monitoring of the Caspian tern	Finnish Museum of Natural History
Winter bird census	Finnish Museum of Natural History
Monitoring of the gyrfalcon	Metsähallitus
Monitoring of the peregrine falcon	Metsähallitus
Monitoring of the golden eagle	Metsähallitus
Archipelago bird census	Finnish Game and Fisheries Research Institute
Surveillance of rare and threatened bird species	BirdLife Finland
Monitoring of the lesser white-fronted goose	WWF Finland
Monitoring of white-backed woodpeckers	Metsähallitus
Monitoring of the Arctic fox	Finnish Forest Research Institute
Monitoring of Saimaa seals	Metsähallitus
The wildlife triangle scheme	Finnish Game and Fisheries Research Institute
Monitoring of grey seals	Finnish Game and Fisheries Research Institute
Monitoring of ringed seals	Finnish Game and Fisheries Research Institute
Monitoring of beavers	Finnish Game and Fisheries Research Institute
Monitoring of large carnivores	Finnish Game and Fisheries Research Institute
Monitoring of wild forest reindeer	Finnish Game and Fisheries Research Institute
Survey of Finnish herpetofauna	Finnish Museum of Natural History
Coastal fish monitoring in the northern Baltic proper	Finnish Game and Fisheries Research Institute
Atlas of Finnish fish / the Finnish fish stock register	Finnish Game and Fisheries Research Institute
Monitoring of salmon and sea trout in rivers	Finnish Game and Fisheries Research Institute
Surveillance of spawning landlocked salmon	Finnish Game and Fisheries Research Institute

Appendix 5: The value of biodiversity as constructed in the nature values trade pilot project in the METSO programme (Paloniemi & Varho, 2006) (usage of this fairly advanced evaluation framework has been discontinued because of the EU's State Aid law)

Criteria	Explanation	Price (euros/hectare/year)
Area size	Bigger areas are more beneficial in terms of biodiversity conservation than small areas.	5–10 ha = €10/ha/a >10 ha = €20/ha/a
Tree stand	Timber value is calculated by a special computer program, taxation (20%) is deducted from the price, and then interest (1%) is added to the price.	€0–100/ha/a
Loss of income	Loss of income is most often a result of the decaying of timber.	€0–40/ha/a
Forest structure	The ages and sizes of the trees in forests in economic use are often almost the same. In contrast, old-growth forests have trees of various ages and sizes, and such a forest structure gives an extra bonus.	€10–20/ha/a
Large deciduous trees	Intensive forestry has decreased the numbers of deciduous trees in the forests, causing endangering processes. Aspen is especially essential for many species.	Large aspens: €10–50/ha/a Other large deciduous tree species: €5–40/ha/a
Old pines with thick bark	Forest sites with old pines are rare nowadays, which endangers certain species.	€5–25/ha/a
Decaying wood	The economic usage of forests has caused considerable qualitative and quantitative reduction of decayed wood. Therefore, both the amount and the grade of decayed wood are assessed in the NVT. The criterion for the highest category is met when the amount is over 20 m^3/ha.	Standing decayed coniferous wood: €5–45/ha/a Standing decayed deciduous wood: €15–50/ha/a Decayed wood on the ground: €5–45/ha/a
Burnt wood	Nowadays, forest fires occur very seldom; therefore, burnt wood and the species dependent on it have become rare. The criterion for the highest category is met when the amount is over 100 m^3/ha.	€25–100/ha/a
Hardwood forests	Hardwood forests have become rare, because they have been cut down for fields, and the species dependent on such biotopes have become rare as well. The criterion for the highest category is met when the amount of hardwood is over 100 m^3/ha.	€20–100/ha/a
Unmanaged water systems	Extensive drying of mires and other wetlands has endangered many species. When the water system of the site is unmanaged or normalised after management, the bonus is paid.	€0–20/ha/a
Special plant species or diversity of polypore species	Some rare species increase the conservation biological value of the site; therefore, a bonus is paid if they exist on a site.	€0–20/ha/a
Location	A bonus is paid when the site is near existing nature conservation areas.	€0–20/ha/a
Recreation and scenery value	A bonus is paid when the site increases social sustainability (for example, is situated near a village or onshore, or has a nature trail or skiing trail).	€0–20/ha/a
Conservation management	A bonus is paid for active practices (such as production of decaying wood, normalisation of the water system, or grazing of pastures) that are meant to benefit nature conservation.	€0–40/ha/a

Appendix 6: Monitoring commitments

The European Union has specified the species of flora and fauna and the natural habitats that it considers to be targets of general interest to the European Community. Preserving, protecting, and improving the environment, including biodiversity, is provided for in Article 174 of the establishment treaty (European Commission, 2007, p. 6). The species of flora and fauna and the natural habitats of community interest are listed in the annexes of Directive 92/43/EEC. In Finland, there are 125 species that are listed in annexes II, IV, and V and 69 habitats belonging to Annex I, excluding the species for which Finland has obtained reservation in the Treaty of Accession (Finnish Environment... 2008a, p. 399). According to Directive 92/43/EEC, it must be ensured that these species and habitats retain Favourable Conservation Status or are restored to it. Article 11 of Directive 92/43/EEC states that the species and habitats covered by the directive must be monitored. Article 17 orders each Member State to prepare a report to the European Commission every sixth year on the most important findings from monitoring of the species and habitats of community interest and their FCS assessment. The first period of this reporting covered 1994–2000. Before then, Member States weren't obliged to include in their reports either monitoring results or the precise plans for their monitoring (Kemppainen & Mäkelä, 2002, p. 7). The first round of FCS work can be seen as more like a practice round.

In Finland, monitoring the species has been easier than monitoring the habitats, because monitoring threatened species has a longer tradition than monitoring of habitats does. The first official evaluation of threatened species in Finland was done in 1985 (Finnish Environment..., 2007), and the most recent official evaluation was conducted in 2007–2010. In a notice issued by the Ministry of the Environment, the latest evaluation was described as very extensive, covering 21,400 species, with the top 160 species experts of the country involved (Finnish Ministry of the Environment, 2010b). The monitoring of species has been different from the monitoring of the habitats listed in the above-mentioned directive. The habitat monitoring had to be designed from first principles, because not much monitoring of habitats had been organised before. Although species monitoring stands on firmer ground, not all species listed in the directive have been covered sufficiently by the domestic monitoring regime or by the data gathered for domestic purposes (Kemppainen & Mäkelä, 2002, p. 7).

In the Finnish national monitoring system, biodiversity monitoring is divided into two subcategories; general biodiversity monitoring and special biodiversity monitoring. General biodiversity monitoring incorporates observation of the broader changes in the Finnish species and habitats. Special biodiversity operations target habitats, species, or populations that are either internationally or domestically rare and under threat of extinction. Obligations exist for these habitats, species, and populations to be monitored by means of various kinds of regulations, acts, and international conventions (ibid., p. 9).

Monitoring of the habitats and species under the Habitats Directive forms a part of special biodiversity monitoring in Finland. The habitat types listed in the Habitats Directive cover well the Finnish habitat types that are domestically rare and important for biodiversity. The species listing under the Habitats Directive is, nonetheless, much shorter than the list of threatened species in Finland. Not all special biodiversity monitoring needs can be addressed by monitoring of only the species under the directive. Because there are so many species that should be monitored, it has been necessary to prioritise their monitoring in line with international and domestic principles. Species in need of special monitoring are divided into five subcategories by how intensely, how precisely, and how specifically they need to be monitored if enough information is to be collected for their protection and management (ibid., pp. 7–10).

All species under the Habitats Directive belong to monitoring priority category I, which means that the monitoring of these species is of principal importance and they must be monitored intensively. International principles for prioritisation take into account the Habitats Directive, the Bird Directive, and international agreements such as the Bern Convention on the Conservation of European Wildlife and Natural Habitats (29/1986) and the Bonn Convention on the Conservation of Migratory Species of Wild Animals (62/1988). Although adherence to these conventions doesn't affect the prioritisation directly, all species addressed by the conventions have been checked to ensure that their international status is considered in the dissection and prioritisation of the monitoring needs (ibid., pp. 10–11).

During the third domestic evaluation of threatened species, species were named for which Finland has particular responsibility. These are the European species Finland carries much international responsibility to protect. Those species that have a small overall distribution or have a large overall distribution but prevalence only in

small patches or that are native to Finland or to Northern Europe were named as responsibility species. Species threatened at the world level are also designated as responsibility species. The status of responsibility species means mostly that the species must be monitored and its habitats must be paid attention to in land-use planning. Status as a responsibility species doesn't give a species definitive juridical status, nor does it involve specific protection measures (ibid., pp. 10–11).
Domestic prioritising of species for monitoring includes mostly the species that are listed in the Nature Conservation Act as especially protected or threatened species. Because game species and fish species of economic value aren't part of the Nature Conservation Act's annex of species that are protected, the endangerment of these species is taken into account in line with the IUCN endangerment classes (ibid., p. 12).

An evaluation of the endangerment of Finnish nature types was completed in 2008 (Finnish Environment..., 2011). The project was carried out from 2003 to 2008 (Finnish Environment..., 2009a). All of the naturally born biotopes and the traditional countryside biotopes developed by grazing were included in this evaluation (Finnish Environment..., 2008b). The main goal of the evaluation was to form a general picture of the current state of the biotopes, the development of their state in recent decades, and a sense of the threats affecting them in the near future (Finnish Ministry of the Environment, 2008). The group of specialists behind the evaluation work have prepared also 70 recommendations for measures to be taken that could enhance the condition of the biotopes. These measures include work at many levels: preventing negative effects of climate change, and tackling the eutrophication issues of the Baltic Sea needs international co-operation. A large-scale approach is needed in planning for enhancement of the state of inland waters, mires, and forests. This includes taking broader ecological scales such as river basins into account when one is designing management measures. Also a small-scale approach is needed, with allocation of precise measures for small-sized biotopes. Both land-owners and summer-cabin-enjoyers are needed in work on sand beaches and farmyard fields (Finnish Environment..., 2008b).

The project involved all Finnish nature types and biotopes, divided into seven main groups: the Baltic Sea and the coast, the inland waters and the shores, the mires, the rocks and boulders, countryside biotopes, and the fells. In all, 368 nature types and their combinations were evaluated. The findings were that 51% of them were considered threatened (Finnish Ministry of the Environment, 2008). In the context of the evaluation, the first catalogue of Finland's responsibility biotopes was made. The endangerment of biotopes was judged to be greater in Southern Finland (66%) than in Northern Finland (29%), which is explained by the differences in land use (Finnish Environment..., 2011).

The biotopes that were evaluated to be well-preserved were those with a remote location or biotopes found on barren and difficult terrain (Finnish Environment..., 2008b). The main reasons behind the endangerment were the renewal procedures and treatment of forests, trenching and drainage, eutrophication and pollution of waters, clearing of land for cultivation, and hydraulic engineering (Finnish Environment..., 2011). Like the evaluation of the threatened species, the evaluation of the endangerment of the biotopes is likely to have an effect on their monitoring prioritisation in the future. The share of the threatened biotopes is biggest in the main-level group of countryside biotopes (93%) and second greatest (70%) in the main-level group of forests (Finnish Environment..., 2008b). Threatened biotopes in these main groups are important targets for future monitoring. The proportion of endangered biotopes is smallest in the main-level group of small fells and that of rocks, which means that these groups probably do not need such intensive monitoring in the near future (ibid.). Also the results of the latest evaluation of threatened species point to the forests and to the countryside biotopes because the majority of the threatened species live in the forests (36.2%) and in the countryside biotopes as well as in other biotopes changed by human activities (23.3%). Changes in forest habitats, such as diminishing of decayed tree material, measures for forest renewal, clear-cutting, and soil cultivation by machines, constitute the principal cause of endangerment in forest habitats. Closing up of meadows, fields, shores, and ridges by vegetation growth is the prime reason for endangerment of the species in the countryside and habitats formed by human activities (Finnish Ministry of the Environment, 2010b). Some species of forest beetle were found to have benefited from the trees saved in timber-felling areas. At the same time, protective measures are still needed, because the situation had worsened for lichen, butterflies, hymenoptera, and other forest beetles (ibid.). The domestic endangerment evaluations are an important part of evaluation of monitoring responsibilities. They are also important for gaining knowledge of how protection measures have contributed to the condition of species and habitats.

Appendix 7: Scales of examination and interpretation, and scale problems by science group

<table>
<tr><th></th><th>goals</th><th>nature</th><th>human activity</th></tr>
<tr><td>Examination (where the focus is)</td><td>* Location of important and relevant levels of examination for solving certain problems / What are the relevant inspection levels for solving a certain problem?</td><td colspan="2">* What hierarchical relationships exist in nature or at the levels of human organisation
* Local, regional, state territorial, or global nature/action
* Examinations of micro and macro phenomena
* Examination through horizontal-to-vertical thinking
* Time scales and spatial scales (e.g., fast–slow, small–large, or the time and spatial scales of interest for conservation of a certain target)
* Economic scales
* Observation of the relationship between nature and society in time, and the individual phases of the relationship (eco-history)
* Which scales of possible examination are offered by different technologies</td></tr>
<tr><td rowspan="2">Interpretation (through the context)</td><td rowspan="2">* Interpretation that produces a solution or solution options for a problem or an interpretation that aids in understanding conservation problems better
* Well-functioning simplifications</td><td colspan="2">* Structural interpretations
* Processual interpretations
* Interpretations based on analogies
* Interpretations combining natural sciences and social sciences
* Interpretations with their origins in concepts (e.g., eco-sociality – the problem of whether we have concepts through which it is possible to describe both nature and society at the same time)
* Models including elements from both nature and society
* Different theories – e.g., actor network theory and its view of scale
* Interpretations in the context of basic research and applied research</td></tr>
<tr><td>* Concepts, models, and theories of scales in nature</td><td>* Examination of new and concrete scales of interpretation and interest in nature conservation, science, exploitation of nature and its resources, and governing and governance
* Examination of how legislation takes into account different scales
* Examination of informal scales of everyday life
* Scales of interest to those who practise nature conservation or exploitation
* Examination of the functionality of governance and how different governance levels and citizens are able to co-operate, how the co-operation work is made possible, and what it produces</td></tr>
</table>

Scale problems	* Control of the economy's operational spatial and time scales and their effects on nature and the consequences of these effects * The choice of functional conservation scales and governance scale problems in conservation	* Continuous change * Contingency and the simultaneity of different processes in nature and society * Problems related to scaled understanding of the world and to ways of thinking: the local isn't its own separate place, the global can be local, and theory can expose scientists' presumptions concerning important scales * Scale interpretations, which are political * The issue that local solutions can depend on global and multinational powers – for solutions tailored to a certain area, co-operation, time, and resources need to be poured into the process before results can be expected, and the scales of interest might change or become shared only through such co-operation processes

Appendix 8: Scale problems of biodiversity governance in cases of agriculture and forestry, mire and peatland protection, and general conservation as presented by the focus groups

agriculture and forestry	mires	general conservation
The landscape structure of agricultural lands has on the large scale become more uniform, and many small landscape elements relevant for biodiversity that earlier were abundant and valuable are missing Traditional agricultural biotopes need management, as grazing, once commonplace, has decreased radically – management of the biotopes is expensive and difficult because of the division among cattle-keeping, agriculture, and forestry, which used to be income sources for the same farm Differences between places are great, as with south-west Finland, which can be viewed as the whole of Finland in miniature: the alteration, variation, and small size of biotopes are a factor; also, areas dominated by fields might need their own conservation measures, distinct from those for the rest of the land area of the whole country, if they are to be conserved effectively The land ownership arrangement and differentiated needs for land use can complicate and hinder conservation if the desirable conservation target is located on the land of several owners The price of land is high in the areas that are densely populated, where the pressures of development mean that nature conservation targets are unlikely to be seen as important targets for land use in comparison to the rest of the development targets Administrative orders related to governance of conservation efforts in agriculture and forestry can be very strict – e.g., in terms of the percentage of forests or fields there should be in the area for the land-owner to receive financial support for conservation efforts: financial support can also be targeted only for fields or forests, so it is not easy to deal with the ecologically important border areas between the two land-use entities; incentives for conservation and utilisation can be, and are, contradictory (also, the conservation measures allowing one to take into account ecological scales in agriculture and forestry require a lot of time and land-owners' or producers' own activity) If conservation areas are created, there is always the option of forestry measures intensifying outside the conservation area; it is not known whether the forestry operators managing the areas near conservation areas can or do take into consideration the effects of the management on conservation areas (action in one place can influence other places – e.g., acts concentrating on a lake can have an effect upon water areas connected with the lake)	The mires and peatlands are fragmented and patchy habitats, which can lead to problems for species adapted to a certain microclimate when the climate warms. The outputs of the endangerment reviews are not immediately operational; instead, they enter the legislation with delay. It is not easy to control several kinds of human action occurring in one place with only one control measure or instrument. Decisions made earlier have effects on the later situation, which can create conservation problems. Area-related concepts such as forests and mires can be unclear and political. Ecosystems are not always treated as sound and realistic entities – e.g., woodlands were argued to have a strange position in the division of nature types between mires and forests, according to a representative of the Finnish Association for Nature Conservation. The perspective of mire amalgamation (ecological coherence and wholeness) enters consideration only rarely and weakly in consultants' Environmental Impact Assessments for mire usage. The examination of mire and peatland issues in terms of numbers and averages gathered from the whole country can lead the actors to misinterpret the magnitude of regional and local changes. The species that are not noticed during an inventory of sites for possible peat extraction cannot be taken into account in the plans. Also, not all human action in mire and peatland areas requires an inventory of the nature of the mire. It is, therefore, possible that important biodiversity hotspots can be destroyed if their existence is not noticed.	The network of conservation areas is not representative in Southern Finland, because of historical developments and historical conservation choices. Carrying through of conservation efforts to a scale that could be ecologically highly efficient might be very expensive and possibly would demand such great changes from society that they do not get executed. Conservation of species and habitats is restricted to very small targets/ areas – it is not easy to conserve fuller entities in nature, such as entire groups of islands. Also, animals can enter and leave conservation patches without caring much about the conservation borders set by humans (as in the case of migratory birds). It is not easy to predict processes of nature; therefore, they are not easily governed. Economic judgements and values affect the amount of money directed to conservation aims. Economic time scales in, e.g., terms of government or terms of conservation programmes affect what can be done and what kind of action in space will receive funding. The borders of the administrative zones are different from the borders of entities in nature – such as river basins – which can create co-governance

agriculture and forestry	mires	general conservation
Long-time-scale changes matter – such as the effect of climate change on species' habitats and species' need to move to adequate habitats if the habitats of today are going to change too much for them to be sustained Loss of biodiversity and conservation problems cannot be dealt with only through establishment of official conservation areas The amount of time needed for monitoring the conservation efforts is not known	Reconstruction of mires takes a very long time, many thousands of years. The young mires developed by land uplift are usually not left alone to develop into full mires or remain unprotected because the land uplifts are treated as if they will change into something other than mires, because something else is more useful and valuable.	problems. Conservation involving the land of multiple land-owners or in areas of different jurisdictions can be slow and difficult – not all relevant actors want to take part. Climate change speeds up the process of change and transition in bio-geographical zones.

Appendix 9: Scales of examination and interpretation by the groups, for agriculture and forestry, mire and peat-land protection, and general conservation

	goals	nature	human activity
Examination (where the focus is)	Through the conservation targets: scales important for protection of species and habitats, ecological processes, important scales related to ecological principles considered important in conservation (e.g., connectivity), and scales of examination related to protection on the lands of a land-owner or in the context of land-use planning / a larger context If the goal is to preserve ecological wholeness and complete ecosystems, the question of whether there is enough acreage in the conservation area for this Targets in time related to conservation (e.g., target years)	The functional entities of nature and their parts, from the level of bacteria to biomes or relationships of inland waters, river basins, and networks of waters Scales important for species, species needing each other, habitats, individual members of species, populations, and development of biotopes Scale questions in relation to specialised species / general species / invasive alien species The seasonal change and phases in nature: ice ages, seasons, mating seasons, and the developmental phases of nature types	The societal organisation's spatial entities from field to world and from local to global Whose scale of examination is involved: land-owners' or administrative officers'; central and peripheral points of observation; and local, regional, state-centric, EU-centric, multinational, or worldwide observation Different observation hierarchies embedded in nature's utilisation and conservation: e.g., surplus trees – key biotopes – conservation-area network or tree, forest stand, and the acreage and area of forestry planning The ownership continuum: rented land, state land (economic or conservation use), company-owned land, private land, land owned by municipalities – conservation of each can create its own scale challenges and problems; whose jurisdictions collide and how this affects the spatial forms of human action How nature conservation affects welfare, prosperity, and wealth development and the associated goals The human cycles affecting nature conservation: budget seasons, seasons of certain programmes, government season Different kinds of observation technologies; map inspection, inspection of conservation targets in land-use planning, the targets found in inventories, and different people's ability to get hold of the information on the results of the inventorying or the geographical representativeness of the inventory data

Interpretation (through the spatial or time-related context)	The value of the species or the habitat locally, regionally, or nationally The goals of local, regional, national, and/or global development – is the conservation target national or European? What is at the moment or has been the value and need hierarchy in the context of land-use planning, how a certain landscape and its features are assessed, and how the landscape features important for biodiversity can be incorporated in the context of land-use planning	The information related to larger entities in nature and their parts How the plant and animal life react to natural and anthropogenic changes, how biodiversity evolves, and what the broad and small-scale effects of human action are	What the conservation areas include and what is left out: the relevant scales of action in relation to creation of ecological networks – connections – stepping stones for biodiversity; whether the conservation solutions will be fine- or large-scale spatially, and how extensive conservation solutions should be The scales of interpretation offered by natural sciences education in relation to the scales of interpretation offered by the administrative order and which administrative sectors take ecological scales into consideration The scale of sustainable use, how much land is supposed to get conserved, and how much should end up being utilised What the developments are in the national or in the EU context in relation to scaling conservation policy The spatial scales that are important for everyday life: Is the conservation area useful for other purposes (e.g., scales of interest from the farmer's angle), how much land is needed for the conservation efforts, and whether the land is waste land or useful field land How long it takes for the ideas in the theory of ecology to come into play in concrete planning of conservation efforts

Scales of interpretation related to amount or continuum of quality	The level of society's approval for a certain kind of conservation or conservation in general: whether approval is on the decline or rising How efforts to increase people's willingness to participate in conservation have developed What the most important conservation targets are and what they were earlier The quality of the expertise in the issue and the amount of expertise available (e.g., certain species might have only a few experts specialising in them) The amount of conservation effort and how great a financial incentive is enough to increase people's willingness to participate in conservation efforts Whether the participatory process and being part of conservation projects has been easy or hard, a light or a heavy burden How the conservation instruments can be classified in terms of their strictness or voluntariness – how much and how easily the different options bring land areas under conservation Whether it is better to protect many small targets or a few bigger ones Whether the conservation has reached its target size in hectares and the number of protected hectares of the relevant biotope or conservation tool/programme? The price and the amount of habitat restoration work being done The time scale for conservation – from permanent to terminable solutions The supply of volunteer conservation areas – large or small	The development of the status of endangerment Which biotopes are most strongly protected, and which are most weakly protected? How many endangered species are there in a certain area? Is it smaller/bigger than other areas? How much ecological information has been gathered from different areas or in relation to targets worth protecting?	The number of administrative personal in conservation work – how it has developed The role of state or local administration in view of the responsibilities for biodiversity conservation – a small amount of responsibility or a large amount of responsibility How the co-operation between actors is arranged – a small amount of co-operation or a great deal of co-operation – and what the quality of the co-operation seems to be (good co-operation, not enough co-operation, etc.) How the various actors are able to access information (enough / not enough information and easy/difficult access) and how much information is considered enough for backing up action Whether the conservation efforts are active (management) or passive (site selection leading to leaving the area alone) Whether there is enough conservation entrepreneurship – e.g., nature management How much time in the conservation processes is reserved for communication and co-operation Whether certain nature elements are unique and more valuable than others